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ABSTRACT

The first of a three-volume final report contains results of six studies on teaching visually impaired students (grades 4-12) to use recorded reference materials. It is explained in the first study that 36 blind Ss demonstrated an acceptable level of proficiency in using dictionary and encyclopedia materials after being trained on the Aural Study System (a combination special record player, unique record format and related written material). The second study reports on an adaptation of the Aural Study System and describes results of two field trials with 25 legally blind Ss. The third study focuses on an investigation of the relative accuracy and time requirements for 48 legally blind students on six written indexes which accompany the aural reference system. Reported are findings of a fourth experiment which indicate that 24 legally blind Ss used a cassette adaptation of the system with accuracy and within time limits, but that the system required further refinements to improve its reliability. A comparison of accuracy and time for recorded dictionary materials and more familiar braille or large type materials is reported in the fifth study involving 16 legally blind sixth and seventh graders. The sixth study describes a consumer review of the cassette dictionary in which 80% of the Ss (10 mature blind consumers, 10 teachers of secondary level blind students, and 10 librarians at residential schools for the blind) stated that they preferred a written dictionary to a recorded one. (CL)

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Final Report

Grant No. OEG-0-73-0642

Facilitating the Education of the Visually Handicapped through Research in Communications

15 November 1972-30 April 1976

Part One

Facilitating Listening as a Medium for Education of the Visually Impaired

June E. Morris, Editor

The research reported herein was performed pursuant to a grant with the Bureau of Education for the Handicapped, U.S. Office of Education, Department of Health, Education, and Welfare. Contractors undertaking such projects under government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official position of the Bureau of Education for the Handicapped.

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FOREWORD

The six studies contained in this report represent application of the results of several years of research on study through listening. This research has dealt with such general topics as compressed speech, comparisons of learning through listening with that through reading large type or braille, factors related to listening comprehension, and finally design of systems for effective study through listening. These six studies clearly demonstrate that blind students can use recorded references effectively. They should lead, ultimately, to the production of a series of recorded references for use by persons who lack the ability to read regular print.

Carson Y. Nolan
Project Director

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Many persons and organizations have cooperated with and were involved in these studies. They include personnel from many of the departments of the American Printing House--Educational Research, Talking Book, Editorial, Printing, Data Processing, and the Business Office. They include staff and students from many educational programs--the Cincinnati (Ohio) Public Schools; the Georgia Academy for the Blind at Macon; the Indiana School for the Blind at Indianapolis; the Kentucky School for the Blind at Louisville; the Maryland School for the Blind at Baltimore; the Michigan School for the Blind at Lansing; the Missouri School for the Blind at St. Louis; the Governor Morehead School at Raleigh, North Carolina; the Ohio State School for the Blind at Columbus; and the Texas School for the Blind at Austin. They include adults, both blind and sighted, from throughout the United States who particiapted in one of the sutides. And they include Dr. Emerson Foulke who served as a consultant on one of the studies.

These acknowledgements should include a note of appreciation to three publishing companies, Field Enterprises Educational Corporation, Scott Foresman and Company, and Dell Publishing Company, for granting permission to record selections from their reference works, *The World Book Encyclopedia*, *Thorndike-Barnhart Junior Dictionary*, and *The American Heritage Dictionary of the English Language*, respectively, for use in these studies.

Special recognition is warranted for those individuals who played key roles in the work being presented here. Foremost among these is Bob Phelps, a research and development technician in the Printing House's Talking Book Department, from whose imagination and skill came the unique indexing systems for recordings developed and used. Working closely with him in preparation of the various forms of indexed recorded materials was Jim Kerns. Other persons deserving special recognition are those in the Educational Research Department at the Printing House who assisted the senior authors in preparation of the materials and in the data collection, tabulation, and statistical analyses. These included Edward Berlá, Anthony Biacchi, Larry Butterfield, Deborah Hill, Elizabeth Hurko, Margaret MacDougall, and Marvin Murr.

To all of these who have helped in ways both great and small, the senior authors express their thanks.

STUDY I

EVALUATION OF AN INDEXING DISC SYSTEM AS A REFERENCE SOURCE

Carson Y. Nolan and June E. Morris

Abstract

The indexing disc system is composed of a special record player, a unique record format, and ancillary written material. Use of this system as a reference source was evaluated using 36 blind students from grades 4-12. Subjects were taught to use the system, then tested on their mastery of it using dictionary and encyclopedia materials. These data were compared with data for similar materials in written form in terms of location times, accuracy of locations, and accuracy of responses for subjects using braille and for those using large type. Generally, time and accuracy data favored the written medium; however, most differences were not of practical importance. Subjects demonstrated they were able to use recorded reference materials at an acceptable level of proficiency. As expected, those from the higher grades performed significantly better than those from lower grades.

STUDY I

EVALUATION OF AN INDEXING DISC SYSTEM AS A REFERENCE SOURCE

The purpose of this project was to explore the usefulness of the Aural Study System (Morris, Nolan, & Phelps, 1973), an indexing disc system, as a reference source. The system consisted of a special record player, a unique record format, and ancillary written materials. It was built to specifications determined through analyses of the tasks involved in studying from recorded material. One of its most important features was an index capability which allowed topics on a record to be found quickly and precisely.

The Aural Study System was initially developed as a source for textbooks. During its evaluation, its potential as a source for reference materials became apparent. At the same time, the need arose for a new or updated encyclopedia for use by the visually handicapped. This need gave impetus to evaluation of the Aural Study System as a source for such material.

The goal of the study was to determine if visually handicapped students could use recorded references successfully. Two references, an encyclopedia and a dictionary, were tested. The criteria of success were whether, after a brief familiarization experience, students could locate topics and accomplish educational tasks within practical time limits. To provide an ultimate standard, time for students to accomplish equivalent tasks with braille and large type materials were also determined. However, it was not expected that results of use of the recorded medium would equal those for braille or large type because of the very great differences in experience favoring use of the written medium.

Method

Design

Although the major interest was whether tasks could be accomplished within practical time limits, the experiment was designed so that the data could be analyzed through six mixed model analyses of variance. For both the dictionary and the encyclopedia, analyses were made of the time required to locate items, the accuracy with which items were located, and the accuracy of responses to questions about the items. In each analysis the within subject variable was medium (written vs. recorded) and the between subjects variables were reading type (braille vs. large type), grade level (4-6, 7-9, and 10-12), and order (A items written/B items recorded vs. A items recorded/B items written).

Subjects

Subjects were 36 legally blind students ranging in grades from 4-12. Four subjects were required at each grade level; two of whom read braille and two of whom read large type. Potential subjects were selected randomly from those available at each grade level with alternates, in order of use, also being identified. All subjects were from regular classes and had IQs of 85 or higher. The majority of the subjects came from the Indiana School for the Blind at Indianapolis with the balance coming from the Cincinnati (Ohio) public schools and the Missouri School for the Blind at St. Louis. Potential subjects were screened to insure that only those who could demonstrate alphabetization skills be included. This was done by having each potential subject recite the alphabet and complete the Alphabetical Screening Task II, described in Appendix A. In order to qualify for inclusion, the alphabet had to be recited perfectly, self-corrections permitted, and a minimum of seven of the eight pairs of words on the alphabetical screening task had to be alphabetized correctly. (All potential subjects were able to perform adequately on both tasks.) Additionally, braille subjects must have used braille as their primary mode of reading for a minimum of 1 year and large type subjects had to be able to see well enough to use 12-point type. This latter was necessary as the written edition of the encyclopedia they used was produced in this size type. Only students who volunteered after being told what would be required of them were used as subjects.

No effort was made to control for IQ, age, or sex, nor was any attempt made to equate subjects coming from different types of school programs.

Materials

Record players. Four record players were required. Two were used by the two experimenters and the other two were backup machines. The players used were those developed in the Aural Study Systems for the Visually Handicapped project described by Morris, Nolan, and Phelps (1973), and Morris, Nolan, and Brothers (1973). They were especially designed for use by the visually handicapped for aural study and contained a number of special features for this purpose. These features included two indexing capabilities--one for gross search and one for fine search, both a rapid forward and a rapid reverse capability, a pause mechanism featuring instantaneous stopping and starting, and a variable speed capability which, when used in conjunction with the turntable speed control (8 1/3, 16 2/3, and 33 1/3 rpm), provided for a continuous range of turntable speeds from 4 1/6 rpm to 50 rpm.

To find a topic within a recorded book, the user would first refer to a written index to learn the record, side, and the part within the side where the topic would be found. Then he would select the appropriate record; place it on the turntable with the desired side up; and, through use of the system's indexing capability, rapidly find the desired place on the record. This would be done by employing the system's two indexing mechanisms. The first, for finding a major part of the record, enables the user to place the stylus at the beginning of each part of the side by positioning the tone arm directly over a narrow empty band preceding each recorded part. Then, through use of the second indexing mechanism, the record can be rapidly searched, either forward or backwards. During this rapid search, index cues such as page numbers or alphabetically arranged "guide words" are heard which enable the user to constantly monitor his search. When the closest index cue is heard, such as the page number of the page where the sought item will be found, the regular play mechanism is engaged and the content scanned until the exact place is found. This scanning can be done at any speed desired as long as it remains intelligible.

Recorded dictionary selection. A 120-minute recording from the Thorndike-Barnhart Junior Dictionary (Thorndike & Barnhart, 1959a), a dictionary designed for use by students in grades 4-6, was made in the Talking Book Studios of the American Printing House for the Blind (APH). The entire recording was contained on one side of a 12-inch record.

The record on which the recording was produced was especially made for use with the record player previously described. It was stereophonically recorded and contained content information on one channel recorded at 8 1/3 rpm and index information on the other channel recorded at 66 2/3 rpm. Both channels were contained within the same groove but, when played on the special record player, were heard separately. The record was divided linearly into nine approximately equal parts separated by narrow, blank or empty (unrecorded) bands. Because of the nature of a disc, the amount of information contained within each part was not equal.

There were 308 items included on the content channel of which the first was the letter a and the last was the word adolescent. Forty-five of the items (15%) were indexed items meaning they were indicated on the index channel (they were pronounced and their first few letters given). Items on the index channel were calibrated with like items on the content channel. All items on both channels were preceded by "beeps" used as attention getters. Each part of the record started with an indexed item. A listing of the indexed items occurring in each part of the record appears in Appendix B.

Prior to the recording of the dictionary selection, the text material was edited. This was done to make the content identical to that of the braille edition. The editing task included indicating which words to spell (all items themselves as well as all other tenses or forms of the item and all other important words) and the deletion of page numbers, guide words, pronunciation guides, and graphics. Most captions were deleted also; however, where information was included these were integrated into the text. In one case a description was written for information appearing in a graphic and this was inserted into the text.

Index items were selected (see Appendix B for criteria used) and listed (see Appendix B) so that the reader would have copy from which to record them.

Recorded encyclopedia selection. A 120-minute recording from The World Book Encyclopedia (Field Enterprises Educational Corporation, 1959a), an encyclopedia designed for use from grade five through adulthood, was made in the Talking Book Studios of APH. The entire recording was contained on one side of a 12-inch record.

The recording contained 107 items of which 44 (41%) were indexed items (on the index track they were pronounced but not spelled). The first item on the recording was Thousand and One Nights and the last one was Timbuktu. Of the total number of items, 46% offered no information but were referrals to other items.

The design of the record was identical to the one described for the recorded dictionary selection. As for the dictionary selection, a listing of the indexed items occurring in each part of the record appears in Appendix B. Criteria used in selecting these items are also reported in Appendix B.

Prior to the recording of the encyclopedia selection, the text material was edited. This was done to make the content identical to the braille edition. The task included the deletion of page numbers, column headings (guide words), initials of items' authors, graphics, and references to pictures. In most cases captions and legends were also deleted; however, where information was contained these were integrated into the text. When this occurred, where they were to be inserted was indicated and any rewriting required done. Where quotations appeared in the text, these were so noted by the insertion of the words "quote" and "close quote." The editing task also included making decisions as to which words should be spelled. All words other than common ones in the items themselves were spelled after being pronounced on the content channel. In general, other words that were spelled were proper names, foreign words, and all important words in the text that were not common enough to be readily recognized by younger users.

In addition to the editing task, items to be indexed were selected and listed so that the reader would have copy from which to record them.

Written indexes. Written indexes showing the indexed items occurring in each of the nine parts of the dictionary recording and the encyclopedia recording were necessary if users were to be able to locate items quickly and were provided in braille and large type (18-point by APH standards). Copy for them appears in Appendix B. These written indexes were the same as the listings of indexed items to which reference was made in the two preceding sections under Materials.

Written reference materials. Each experimenter needed a set of written reference materials paralleling the recorded materials to use with his subjects. These included a braille copy of the dictionary (Thorndike & Barnhart, 1959b), a large type copy of the dictionary (Thorndike & Barnhart, 1959c), a braille copy of the encyclopedia (Field Enterprises Educational Corporation, 1959b), and a large type edition of the encyclopedia (Field Enterprises Educational Corporation, 1964).

In the case of the dictionary, the recorded, braille, and large type editions were all the same. However, for the encyclopedia, the large type edition was a later edition than the recorded and braille editions which were the same. Additionally, the large type edition was printed in 12-point type size (APH standards) rather than the standard 18-point size normally produced by APH. The reason this edition of the large type encyclopedia was used was because it was the only one available. Although the two editions, 1959 and 1964, were similar in content, many items had been slightly rewritten in the later edition. Because of this, great care had to be taken in the selection of test and practice items so that they would be as nearly identical in the two editions as possible.

Cue cards. Cue cards containing the items in written form were provided in braille and large type for all practice and test tasks.

Procedure

Each subject was scheduled to work individually with one experimenter for five 40-minute periods during a school week. Generally, this was for one period on each of 5 consecutive days. The first 3 days were spent in training the subjects to use the materials and the last 2 days spent testing their use of them. The program for both training and testing is laid out specifically in the Subject Data Record which is shown in Appendix C. Not only did this form detail the training and testing programs, but allowed for recording of data in all relevant stages of the processes.

During the first session the objectives of the study were described and subjects were given a brief review of the purposes, uses, and formats of reference materials. Following this they were taught to operate the Aural Study System using the dictionary recording as a medium. During the second session, the subjects were required to find two identical words in both the written and recorded forms of the dictionary. They were then required to find additional words in the recorded form. Accuracy of knowledge of spelling was assured by presenting the subjects with a written cue card for each item to be found. A similar procedure was used during the third session to give practice with the encyclopedia items.

Two sets of practice items were required--one set for dictionary items and one set for encyclopedia items. In each set, items to be located were equally divided between those most efficiently found by forward search and reverse search. No test item was included with the practice items. All practice items are listed in the Subject Data Record forms (see Appendix C).

During the fourth session subjects were required to locate and define eight dictionary items--four using the recorded edition, four using the written edition. These items were actually four pairs of adjacent items deliberately selected to insure that the tasks be of similar difficulty. Criteria used for the selection of these items appear in Appendix D along with the test tasks. Separate times were kept for the time required to locate each item and the time required to report its definition. Responses were oral. On the Subject Data Record forms (see Appendix C) the experimenters noted the search technique used, the times required, and whether the response was correct or incorrect. A maximum time limit of 5 minutes was imposed for each task.

During the fifth session subjects were required to locate and answer direct questions about eight encyclopedia items--four using the recorded edition, four using the written edition. Actually, the same four items were used for both modes to insure that the tasks be of similar difficulty. However, different questions were asked about them. Criteria for the selection of these items appear in Appendix D along with the test tasks. Separate times were kept for the time required to locate each item and the time required to respond to the question about it. Responses were oral. On the Subject Data Record forms (see Appendix C) the experimenters noted the search technique used, the times required, and whether the response was correct or incorrect. A maximum time limit of 5 minutes was imposed for each task.

For both the dictionary and the encyclopedia, the four pairs of test tasks were numbered 1A, 1B, 2A, 2B, 3A, 3B, 4A, and 4B. In all cases the A and B tasks for a number were paired items (e.g., 1A and 1B were adjacent items in the dictionary and the same item in the encyclopedia). With dictionary items, the A item always immediately preceded the B item while, with the encyclopedia items, the information required to answer the B item always required slightly more of the text to be covered than for the A item. In no case was this difference greater than 13 words.

Test tasks were grouped in two sequences. This was done in order to counterbalance the media in which the tasks were performed (i.e., using recorded or written reference materials). The sequences were:

Sequence I		Sequence II
written	Task 1A	recorded
written	Task 2A	recorded
written	Task 3A	recorded
written	Task 4A	recorded

Sequence I		Sequence II
recorded	Task 1B	written
recorded	Task 2B	written
recorded	Task 3B	written
recorded	Task 4B	written

Subjects at each grade level of each reading type ($\underline{n} = 2$) were assigned to either Sequence I or Sequence II by chance. A toss of a coin determined the sequence to which the first in each group of two was assigned. The second was then automatically assigned to the other sequence. Grade level and reading type differences that might have existed between the groups were controlled through the experimental design.

This procedure provided for the maximum possible separation between the two parallel tasks. It also promoted expediency as a subject would do all tasks using either medium consecutively rather than having to switch back and forth between tasks. However, it was possible that a practice effect might have occurred related to the ordinal position of the tasks.

Results

Data were analyzed by six separate mixed model analyses of variance in which total scores were used (i.e., the sum of each subject's four trials using each medium). Data for these were as follows:

1. dictionary--location times
2. dictionary--accuracy of locations
3. dictionary--accuracy of responses
4. encyclopedia--location times
5. encyclopedia--accuracy of locations
6. encyclopedia--accuracy of responses

Because the distribution of location times was skewed, it was necessary to do reciprocal transformations before analyzing these data. Between subjects variables in all six analyses were reading type (braille vs. large type), grade level (4-6, 7-9, 10-12), and order (A items written/B items recorded vs. A items recorded/B items written). In all analyses the within subject variable was medium (written reference material vs. recorded reference material).

Significant grade level differences were found, in the expected direction, in each of the six analyses. Subjects from higher grades consistently and progressively performed at higher levels than did subjects from lower grades.

Means and standard deviations for these and all other variables for which significant differences were found in the six analyses are reported in Tables 3 and 4 in Appendix E.

The data of most immediate importance to the goals of this project are reported in Tables 1 and 2. Table 1 gives the percentages of items correctly located within a 5-minute time limit and average location times with their ranges. Table 2 gives percentages of correct responses to questions about the items, average response times, and ranges of response times for items correctly located within a 5-minute limit. Both tables contain data for the dictionary and encyclopedia in both written and recorded form.

Accuracy of location. Percentages correctly located ranged from 94% for the written dictionary items by large type readers to 78% for recorded dictionary and encyclopedia items by braille readers. Differences in accuracy of location between written and recorded material ranged from 2-9%. Only the media difference for the dictionary was significant beyond the 5% level. Large type students performed significantly better than braille students in use of the encyclopedia.

Accuracy of location for both types of references was quite consistent. Accuracy for large type readers was 94% for the written versions of the dictionary and encyclopedia, while corresponding figures for the recorded versions were 85% and 92%. Braille students showed even greater consistency. For the dictionary and encyclopedia accuracy in locating items in the written versions was 83% and 82% and for the recorded versions was 78%.

Time for item locations. Average times required to locate items ranged from a low of 37 seconds for written dictionary items by large type students to a high of 131 seconds for recorded dictionary items by braille students. Times required to find items in the recorded medium were consistently higher than those for the written medium. This difference was statistically significant at the 1% level of confidence. The extent to which location times for recorded materials exceeded those for written materials were 197% for the large type dictionary, 46% for the large type encyclopedia, 118% for the braille dictionary, and 40% for the braille encyclopedia. Ranges of times for each reference and medium were also determined. For the dictionary, ranges of location times for the written materials appear to exceed those for recorded materials over the entire range of scores. However, for the encyclopedia this does not appear to be the case in that scores in the upper range of the recorded distributions are lower than is the case for written materials.

Accuracy of responses. Once items were located, students were required to answer questions about them. Accuracy of responses ranged from 94% for written dictionary items for large type students to 68% for written encyclopedia items for braille students. However, no significant differences between the media for response accuracy was found for either type reference.

Response times. Times required to find answers to questions in all cases favored the recorded materials. These times ranged from an average of 11 seconds for recorded dictionary items for large type students to 44 seconds for written encyclopedia items for braille students. Inspections of ranges of response times reveals that those for recorded media are consistently narrower with spread of scores reduced most within the higher response times.

Table 1

Percentages of Items Correctly Located within a 5-Minute

Time Limit and Average Location Times

	Percentage of items located correctly	Range of location times (sec.) per item	Average times (sec.) required per item
Large type subjects			
Dictionary			
Written	94%	10-117	37
Recorded	85%	39-260	110
Encyclopedia			
Written	94%	10-259	59
Recorded	92%	37-219	86
Braille subjects			
Dictionary			
Written	83%	10-220	60
Recorded	78%	48-265	131
Encyclopedia			
Written	82%	18-295	77
Recorded	78%	42-240	108

Table 2

Percentages of Correct Responses and Average Response Times for Items Correctly Located within a 5-Minute Time Limit

	Percentage of items responded to correctly	Range of response times (sec.) per item	Average times (sec.) required per item
Large type subjects			
Dictionary			
Written	94%	2-79	12
Recorded	85%	2-38	11
Encyclopedia			
Written	83%	5-162	35
Recorded	83%	15-132	33
Braille subjects			
Dictionary			
Written	81%	3-69	20
Recorded	78%	4-22	10
Encyclopedia			
Written	68%	6-139	44
Recorded	72%	15-97	37

Additional Findings

Two additional findings of interest occur in the statistically significant interactions between grade level and medium for both the dictionary and encyclopedia for the location time data. The extent of these interactions is apparent in the approximate data appearing in Tables 3 and 4 in Appendix E. In both cases, the rate of decrease in location times as grade levels increase is greater for written materials than for recorded. This doubtlessly reflects differential experience with the media.

A problem that should be noted was that some subjects did not have enough experience with alphabetical listings to be able to locate words skillfully in either the written or recorded reference materials.

Discussion

As indicated in the introduction, the goal of this study was to determine if visually handicapped students could use recorded references successfully. To provide an ultimate standard, times for students to accomplish equivalent tasks with braille and large type materials were determined. However, it was not expected that results of the recorded medium would equal those for braille or large type because of the very great differences in experience favoring use of the latter medium.

As expected, location times for finding topics in both references were significantly shorter for the written medium. Location times for the recorded material ranged from 40-197% greater than those for the written materials. The longest mean recorded location time was 2 minutes, 11 seconds. The time of location differences in all likelihood reflect great differences in experience with the media. For this study, the total experience of the subjects with the recorded medium for reference materials was less than 4 hours. This is in contrast with a probable much greater experience with the materials in written form which were available to the students in their classrooms and school library. The import of greater experience favoring the written encyclopedia materials is documented by the significant medium x grade level interaction which shows the difference between media for location time to increase significantly with increase in grade level. This effect is less clearcut for the dictionary materials.

For accuracy of location, significant media differences were found favoring the print dictionary. However, even with the subjects limited experience in the use of recorded references, these differences were quite small ranging from only 2% to 9%. From the standpoint of practical use such differences lack meaning. The level of accuracy of location of items appears quite acceptable.

The results on accuracy of answers to questions about items when located generally failed to differentiate significantly among the media. Again under conditions of relatively short experience, the recorded medium appeared acceptable.

Times required to find answers to questions consistently favored the recorded medium for all materials. This probably reflects the greater communication rates attained through listening as compared to those attained through reading large type or braille.

From the standpoint of practical use, the data support development of recorded references for the visually handicapped. With the exception of times required to locate items, all criteria give evidence of their comparability in use to print materials. The item location time differences are believed to reflect differences in skill levels heavily dependent upon experience. It is strongly believed that equating experience would eliminate these differences. Even if this were not entirely the case, the material would still be of comparatively great practical value.

Other factors support the usefulness of recorded references. Any person having reading difficulty might benefit from their availability. In addition to braille and large type students, students who experience reading problems from such factors as dyslexia and mental retardation might benefit. Students who cannot handle books, such as the crippled and the cerebral palsied, with help, could use recorded materials. One set of references could serve a wide range of students with varying disabilities.

Two other very practical factors, required storage space and cost, appear to favor recorded references, at least for the visually handicapped. The following comparisons are based on estimates for publishing the 1973 World Book Encyclopedia in braille and recorded form.

Estimates are that the braille edition of the new encyclopedia would require 168 feet of shelf space to house it. In recorded form it could be contained on 580 flexible records which would require approximately 3 to 4 feet of shelf space. Additionally, a little space would be needed for storage of the player. Similar savings would be made for other reference works such as dictionaries.

Conclusions

Comparison of the efficiency of use of recorded references with the efficiency of use of their braille and large type counterparts showed few differences of practical significance. Other factors such as more generalized usefulness, lower cost, and vast reduction of required storage space strongly support the development of recorded references. Consequently, it is concluded that further development of the Aural Study System as a reference tool is justified.

References

Field Enterprises Educational Corporation. The world book encyclopedia (Vol. 16). Chicago: Author, 1959. (a)

Field Enterprises Educational Corporation. The world book encyclopedia (Vol. 129) (Braille ed.). Chicago: Author, 1959. [Published in braille through the generosity of the publisher and the Field Foundation by--Louisville, Ky.: American Printing House for the Blind, 1960-1961.] (b)

Field Enterprises Educational Corporation. The world book encyclopedia (Vol. 27) (Large type ed.). Chicago: Author, 1964.

Morris, J. E., Nolan, C. Y., & Brothers, R. J. Aural study systems for the visually handicapped: Field trial of the Aural Study System: Interim progress report no. 10 [Project No. 8-0046; Grant No. OEG-0-8-080046-2670(032)]. Louisville, Ky.: American Printing House for the Blind, 1973. (ERIC Document Reproduction Service No. ED 078 620)

Morris, J. E., Nolan, C. Y., & Phelps, E. G. Aural study system for the visually handicapped: Description of the Aural Study System: Interim progress report no. 9 [Project No. 8-0046; Grant No. OEG-0-8-080046-2670(032)]. Louisville, Ky.: American Printing House for the Blind, 1973. (ERIC Document Reproduction Service No. ED 078 620)

Thorndike, E. L., & Barnhart, C. L. Thorndike-Barnhart junior dictionary. Chicago: Scott, Foresman, 1959. (a)

Thorndike, E. L., & Barnhart, C. L. Thorndike-Barnhart junior dictionary (Vol. 1) (Braille ed.). Scott, Foresman, 1959. [Embossed and printed by permission of the publisher by--Louisville, Ky.: American Printing House for the Blind, 1961.] (b)

Thorndike, E. L., & Barnhart, C. L. Thorndike-Barnhart junior dictionary (Vol. 2) (Large type ed.). Chicago: Scott, Foresman, 1959. [Large type edition published by permission of the publisher by--Louisville, Ky.: American Printing House for the Blind, 1962.] (c)

Thorndike, E. L., & Lorge, I. The teacher's word book of 30,000 words. New York: Columbia University (Teachers College, Bureau of Publications), 1944.

APPENDIXES

APPENDIX A

ALPHABETICAL SCREENING TASK II

Alphabetical Screening Task II

As reference works are arranged alphabetically, it was essential that all subjects participating in the study both know the alphabet and know how to use it in determing the alphabetical position of words. In order to determine the latter, a screening device was constructed requiring the testee to mark the word in each of eight pairs of words that would occur first in an alphabetical listing. For the first two pairs of words, the critical letters involved the first letters occurring in the words; for the next two pairs, the second letters were the critical ones; for the next two pairs, the third letters; and for the last two pairs, the fourth letters were the critical ones. The right/left position of the words within each pair was determined by the toss of a coin.

Sixteen of the 26 letters in the alphabet were involved in the alphabetizing tasks. No letter was involved more than once and all vowels were included. The letters involved were well distributed throughout the alphabet. They were: a, c, d, e, h, i, l, n, o, p, s, t, u, v, w, and y.

All words included contained four to six letters. They were all common words reported by Thorndike and Lorge (1944) as occurring 100 or more times per million words, which was the authors' category for most frequently used words.

In order that the task not be confounded by a testee's spelling ability or knowledge of the spelling of braille contractions, all words in the braille version of the screening device were spelled out in grade one braille. Type size used in the large type version of the screening device was 18-point (APH standards). Copy for both the braille and large type versions is as follows.

Alphabetical Screening Task II--Braille Copy

American Printing House for the Blind

Reference Study

There are eight pairs of words that follow. Each word is spelled out fully in grade one braille. You are to mark the word in each pair that would come first in an alphabetical listing. Mark the word by drawing a line through it.

1.	clear	dear
2.	would	young
3.	blood	battle
4.	upon	until
5.	from	friend
6.	scene	school
7.	above	about
8.	loss	lost

Alphabetical Screening Task II--Large Type Copy

American Printing House for the Blind

Reference Study

There are eight pairs of words that follow. You are to mark the word in each pair that would come first in an alphabetical listing. Mark the word by drawing a line through it.

1.	clear	dear
2.	would	young
3.	blood	battle
4.	upon	until
5.	from	friend
6.	scene	school
7.	above	about
8.	loss	lost

APPENDIX B

ITEMS INDEXED ON THE RECORDS

Criteria Used in Selecting Items To Be Indexed

Dictionary

1. Indexing was to occur only at the beginning of items.

2. Items selected to be indexed were to be at approximately 150 word intervals.

3. Where indexing was to occur, and a set of similar items were listed sequentially (i.e., account, accountable, accountant, and accounting), the first one listed was to be the indexed one.

Encyclopedia

1. Indexing was to occur only at the beginning of items.

2. Items selected to be indexed were to be at approximately 250 word intervals; however, this varied widely due to the difference in length of the descriptions of items.

3. Where indexing was to occur for an item listed more than once (i.e., thrush meaning a group of songbirds and thrush meaning a contagious disease), the first one listed was to be the indexed one.

Indexed Items for the Dictionary

Part 1

a
abandon
abate
abdicate
abed
abide

Part 2

able
aboard
aboriginal
above
abreast

Part 3

abrupt
absolute
abstain
absurd
abut

Part 4

Acadia
accept
access
accident
accommodate

Part 5

accompaniment
accord
account
accouter

Part 6

accumulate
accustom
ache
acknowledge
acorn

Part 7

acquire
acrid
act
active
acute

Part 8

Adam
add
addle
adequacy
adj.

Part 9

adjunct
administer
admirable
admit
ado

Indexed Items for the Encyclopedia

Part 1

Thousand and One Nights
Thrace
Thrasher
Three-Dimensional Picture
Threshing Machine

Part 2

Thrift
Thrip
Thrombosis

Part 3

Thrust
Thug
Thulium
Thunder
Thurber, James Grover
Thuringian Forest
Thutmose, III

Part 4

Thwart
Thymol
Thyroid Gland
Thyroxine
Tibbu

Part 5

Tiber River
Tibet
Tibia

Part 6

Tick
Tickbird
Ticker
Tidal Air

Part 7

Tide
Tie (1st)
Tientsin
Tierce (1st)

Part 8

Tietjens, Eunice Hammond
Tiffany, Charles Lewis
Tiger
Tiger Cat
Tiglath-Pileser

Part 9

Tigris River
Tilburg
Tile
Tilefish
Till
Tillstrom, Burr
Timarau
Timbrel

APPENDIX C

SUBJECT DATA RECORD

REFERENCE STUDY--SUBJECT DATA RECORD

Name ______________________________ Sex __________

School ______________________________ Grade __________

Week of ____________________ Schedule ____________________

Reading Medium ________________ Data Collector ______________

Has subject ever used a dictionary?

Has subject ever used an encyclopedia?

Comments

Day One

Day Two

Day Three

Day Four

Day Five

General Observations

REFERENCE STUDY--DAILY STARTING SETUP

All equipment and materials should be placed on a table providing ample space.

Two chairs--one for the subject and one for the experimenter

As strong a lamp or lighting as possible in testing environment

Orientation of directions--the user

The player should be setup ready for use

Plugged into an electrical outlet

Lid off and placed behind the player

Speaker plugged into speaker jack on top deck of player

Tone arm swung all the way to the right

Turntable speed control set at 8 1/3 rpm

Appropriate record

Day 1--off turntable and on the table to the right of the player

Days 2, 3, 4, and 5--on the turntable, right side up

Appropriate written index

Day 1--none used; therefore, none present

Days 2, 3, 4, and 5--on the table to the right of the player

Power/volume control--in off position (full counterclockwise)

Tone control--set midway between treble and bass

Variable speed control

Pushed in; therefore, not engaged

Rotated midway between fastest and slowest

Pause control--released

Foot control- not present

Headphones--not present

Appropriate written reference material

Day 1--none used; therefore, none present

Days 2, 3, 4, and 5--on the table to the right of the player, under the written index

Day One

Say to the subject:

> DURING THIS WEEK YOU ARE GOING TO LEARN HOW TO USE A SPECIAL RECORD PLAYER TO FIND ITEMS IN A RECORDED DICTIONARY AND IN A RECORDED ENCYCLOPEDIA. BY THE END OF THE WEEK YOU WILL BE ABLE TO LOCATE SUCH ITEMS WITHOUT HELP FROM ME AND ANSWER QUESTIONS ABOUT THEM.

Day One

Review of Reference Materials

Dictionary

Definition. A dictionary is a book in which the words of a language are listed alphabetically. Definitions and pronunciations are given for the words along with other information.

History. The first dictionary was written more than 2,500 years ago when the Assyrians wrote a dictionary of their language. The first attempt to catalog all the common words of the English language was a dictionary published by Nathan Bailey in 1721. Since that time a number of dictionaries have been compiled. Some of these have been revised and enlarged many times.

Types of dictionaries.

English language
Foreign language
Lexicon--as of an ancient language
Historical

Uses of an English language dictionary. (Ask the subject the purposes for which he has used a dictionary. Then discuss those listed below. Those marked with an asterisk are included in the Thorndike-Barnhart Junior Dictionary. Other uses listed are possible with other dictionaries, however, not necessarily all of them with all other dictionaries. Bring to the subject's attention all uses marked with an asterisk. Use judgment, in accordance with the subject's grade level, as to which, if any, of the others to mention.)

* Meaning of words
  Various meanings listed under separate numbers
  Proper use shown by examples from recognized writers
* Correct spelling
* Correct pronunciation (syllables, accent marks, diacritics)
* Syllables--showing where a word may be divided at the end of a line
* Part of speech
* Other forms of the word
* Abbreviations
* Prefixes and suffixes
Etymologies--derivation of the word from other words
Synonyms--exact meaning of synonyms may be given
Reference to other words with related meaning
Comparison with other related words
Antonyms--words with opposite meanings
Americanizations
Slang meanings
If the word is obsolete
Whether a verb is transitive or intransitive--transitive verbs take direct objects, intransitive ones do not (e.g., He disapproves.)

Day One

Encyclopedia

Definition. An encyclopedia is quite different from a dictionary. The dictionary gives the spelling of a word, its meaning, its pronunciation, and similar information about the word. The encyclopedia takes up the subject for which the word stands. It tells in detail such things as: why it is important in our lives, what it looks like, how it works, and what its history has been. Communication is a word which the dictionary defines in a brief paragraph. But an encyclopedia gives many pages of words to an article on communication. The article describes the various forms of communication such as the telephone, the telegraph, and the radio, and tells how they developed from earlier forms of communication.

An encyclopedia is a reference work that presents a selected collection of facts covering all fields of human knowledge. All the worthwhile things that man has ever known or done from the dawn of civilization to the present day may be found in the pages of an encyclopedia. The basic aims of the modern encyclopedia are:

1. To present the important facts about man, the world he lives in, the things he has done, and the ideas he has developed.
2. To present these facts without bias or personal opinion, in language that is easy to understand.

History. Aristotle, who lived from 384-322 B.C., is known as the "Father of Encyclopedists" as he made one of the first attempts to gather all the knowledge of his time into a series of books. In Aristotle's time it was much easier to compile an encyclopedia than it is today because not so much was known about the world. Today, so much is known that only the important facts can be selected for a general encyclopedia. Good encyclopedias of today have to undergo continuous revision and expansion to keep up with the rapidly growing fields of human knowledge.

Format. Encyclopedias are handy reference works in which information on all or many branches of knowledge may be found. This information is given in articles which are alphabetically arranged so that they may be found easily. Cross references are found with some entries. These tell where more information about the subject may be found.

Uses. (Ask the subject to tell you the kind of thing for which he has used an encyclopedia. Continue with a general discussion of the kind of things a student might use an encyclopedia for; such as, making reports for history and science, getting information needed for writing papers in English, learning more about things about which he is personally interested, etc.)

Day One

Activities to Familiarize Subjects with Record Player and Record

NOTE: Desired terminal behaviors have been underlined.

I. Familiarization to the record player

"The subject should be able to . . ."

A. List verbally the five features that are located on the top deck.

1. Examine the top deck and name the features or controls with which you are already familiar.

2. Discuss location of the turntable, turntable speed control, record guides (stops), speaker jack, and tone arm.

3. Discuss the shape of each feature and its position relative to sides of the top deck.

4. Name the five features discussed in A-2.

B. List verbally the five controls that are located on the front panel. Note also the headphone jack.

1. Discuss the location of the power-volume control, the tone control, the variable speed control, the pause control, and the fast forward/fast reverse control. Note also the location of the headphone jack.

2. Discuss the shape of each control and its position relative to the other controls and reference points of the panel.

3. Name the six features discussed in B-1.

C. Describe each control in respect to its shape and its operation.

1. What is the shape of the volume, tone, and variable speed controls?

2. What is the shape of the pause and the fast forward/fast reverse controls?

3. Activate each control especially noting the movements required for the round controls and the toggle type switches.

4. Demonstrate the range possible using the variable speed control and that normal speed is obtained by merely push-it in.

5. Especially note the power to the machine is activated through the power-volume control.

6. Describe stops for turntable speed control in terms of clock face positions and practice manipulations.

7. Touch any feature or control of the player upon command.

II. Familiarization to the Dictionary Record

"The instructor should tell the subject . . ."

A. The record is divided into nine parts

  1. Subject should examine record tactually--some will be able to feel the blank bands.

  2. Differentiate between the terms "bands" and "parts"

B. The record is cut stereophonically--two channels within a groove

  1. Regular channel containing content

  2. Index channel containing cue words

C. The two channels are played at different speeds

  1. Regular channel--8 1/3 rpm

  2. Index channel--66 2/3 rpm

D. To place the record on the turntable of the player

III. Familiarization to the indexing capabilities of the system

"The subject should be able to . . ."

A. Verbally specify the special features and movement characteristics of the tone arm (i.e., horizontal movement of the arm; record edge finder and button to activate it, lip with which to move tone arm, the lever on top which, when depressed retracts the stylus assembly [making horizontal movement possible] and activates the photoelectric scanning device).

B. Demonstrate how each feature of the tone arm is used.

  1. Use record edge finder to place the needle at the beginning of the record.

  2. Activate the photoelectric scanning device by a light pressure on the lip of the lever at the top of the tone arm.

    a. Move the arm horizontally across the record noting the auditory cues provided.

    b. Relate these cues to the bands on the record.

3. Count the audible signals as the tone arm is moved across the record.

4. Differentiate between the edge of the record and the actual beginning of Part One.

5. Differentiate between the audible cue heard for a band and the audible cue heard from the area near the center of the record.

6. Practice finding bands and setting needle down on them (practice until done successfully three consecutive times).

C. Demonstrate how the index track is searched.

   1. Search forward into a part using fast forward

      a. Listen to two indexed items

      b. Switch to regular channel and listen to second

   2. Reverse to start of part--note sound of index cues in reverse

   3. Discuss alphabetical format

   4. Find the end of a part

      a. Reverse into part and stop at second sound heard

      b. Switch to fast forward to learn what item is

      c. Switch to regular channel and listen to it

IV. Practice

   A. Use two indexing capabilities of the system in a coordinated manner (e.g., find second indexed item in Part 4).

   B. Use variable speed control

      1. Listen to item (IV-A) at the normal rate

      2. Listen to item (IV-A) again this time at fast rate

   C. Use pause control

      1. After IV-B-1

      2. After IV-B-2

   D. Other practice items

Day Two

Dictionary Practice Items

[Note to examiner: The correct direction of search is determined by the item's position on the written index--items occurring in the first half of a part would be most efficiently found through forward search; those occurring in the last half of a part would be most efficiently found through reverse search.]

Review written index.

Turn on record player's power.

1. Find the letter A on the record. [Give cue card.]
   (Part 1, 1st indexed item--forward search)

   Use written index

   Verbalize search technique

   Locate

   Listen to item

   Find the letter A in the written edition.
   (Braille page 1; large type page 61)

   [Give instructions if necessary]

   Read item

   Relate the two

2. Find the word ado on the record. [Give cue card.]
   (Part 9, last [5th] indexed item--reverse search)

   Use written index

   Verbalize search technique

   Locate

   Listen to item

   Find the word ado in the written edition.
   (Braille page 55; large type page 98)

   [Give instructions if necessary]

   Read item

   Relate the two

Day Two

[Remove written edition--it will not be used subsequently during practice]

3. Find the word accident. [Give cue card.]
(Part 4, 2nd from last [4th] indexed item--reverse search)

   Use written index
   Verbalize search technique
   Locate
   Listen--note two meanings

4. Find the word acrid. [Give cue card.]
(Part 7, 2nd indexed item--forward search)

   Use written index
   Verbalize search technique
   Locate
   Listen--note two meanings

5. Find the word abracadabra. [Give cue card.]
(Part 2, 2nd item after 2nd from last [4th] indexed item--reverse search)

   Use written index
   Verbalize search technique
   Locate
   Listen--note two meanings

6. Find the word adder. [Give cue card.]
(Part 8, 2nd item after 2nd indexed item--forward search)

   Use written index
   Verbalize search technique
   Locate
   Listen--note two meanings

7. Find the word acolyte. [Give cue card.]
(Part 6, 3rd item after 2nd from last [4th] indexed item--reverse search)

   Use written index
   Verbalize search technique
   Locate
   Listen--note two meanings

8. Find the word absolve. [Give cue card.]
(Part 3, 3rd item after 2nd indexed item--forward search)

   Use written index
   Verbalize search technique
   Locate
   Listen--note two meanings

Day Two

9. Find the word accrue. [Give cue card.]
(Part 5, 5th item after last [4th] indexed item [last item in part]--reverse search)

    Use written index
    Verbalize search technique
    Locate
    Listen--note only one meaning

10. Find the word accede. [Give cue card.]
(Part 4, 1st item after 1st indexed item--forward search)

    Use written index
    Verbalize search technique
    Locate
    Listen--note two meanings

11. Find the word abhor. [Give cue card.]
(Part 1, 5th item after 2nd from last [5th] indexed item--reverse search)

    Use written index
    Verbalize search technique
    Locate
    Listen--note only one meaning

12. Find the word adjust. [Give cue card.]
(Part 9, 3rd item after 1st indexed item--forward search)

    Use written index
    Verbalize search technique
    Locate
    Listen--note only one meaning

Day Three

Encyclopedia Practice Items

[Note to examiner: The correct direction of search is determined by the item's position on the written index--items occurring in the first half of a part would be most efficiently found through forward search; those occurring in the last half of a part would be most efficiently found through reverse search.]

Review written index.

Turn on record player's power.

1. Find the item Thousand and One Nights on the record. [Give cue card.] (Part 1, 1st indexed item--forward search)

    Use written index

    Verbalize search technique

    Locate

    Listen to item--cross reference

    Find the item Thousand and One Nights in the written edition. (Braille page 773; 12-point page 207)

        [Give instructions if necessary]

    Read item

    Relate the two editions

2. Find the item Timbrel on the record. [Give cue card.] (Part 9, last [8th] indexed item--reverse search)

    Use written index

    Verbalize search technique

    Locate

    Listen to item

    Find the item Timbrel in the written edition. (Braille page 837; 12-point page 225)

        [Give instructions if necessary]

    Read item

    Relate the two

Day Three

[Remove written edition--it will not be used subsequently during practice.]

3. Find the item Tibet. [Give cue card.]
   (Part 5, 2nd indexed item--forward search)

   Use written index
   Verbalize search technique
   Locate
   Do not listen--item is very long

4. Find the item Ticker. [Give cue card.]
   (Part 6, 2nd from last [3rd] indexed item--reverse search)

   Use written index
   Verbalize search technique
   Locate
   Listen--cross reference

5. Find the item Tiflis. [Give cue card.]
   (Part 8, 2nd item after 2nd indexed item--forward search)

   Use written index
   Verbalize search technique
   Locate
   Listen to only a line or two

6. Find the item Throttle. [Give cue card.]
   (Part 2, first item after last [3rd] indexed item--reverse search)

   Use written index
   Verbalize search technique
   Locate
   Listen--cross reference

7. Find the item Thursday. [Give cue card.]
   (Part 3, 1st item after 2nd to last [6th] indexed item--reverse search)

   Use written index
   Verbalize search technique
   Locate
   Listen to only a line or two

8. Find the item Thyme. [Give cue card.]
   (Part 4, 1st item after 1st indexed item--forward search)

   Use written index
   Verbalize search technique
   Locate
   Listen to only a line or two

Day Three

9. Find the item Three-Mile Limit. [Give cue card.]
(Part 1, 1st item after 2nd to last [4th] indexed item--reverse search)

    Use written index
    Verbalize search technique
    Locate
    Listen to item

10. Find the item Thule. [Give cue card.]
(Part 3, 1st item after 2nd indexed item--forward search)

    Use written index
    Verbalize search technique
    Locate
    Listen to item--cross reference

11. Find the item Tiberias. [Give cue card.]
(Part 4, 1st item after last [5th] indexed item--reverse search)

    Use written index
    Verbalize search technique
    Locate
    Listen to item--cross reference

12. Find the item Tilden, William Tatem, Jr. [Give cue card.]
(Part 9, 2nd item after 2nd indexed item--forward search)

    Use written index
    Verbalize search technique
    Locate
    Listen to item--date and cross reference

Day Four

Dictionary Test

Sequence _____

[Start timing as soon as task is stated and cue card is given to the subject. When using written edition, stop timing when subject starts to respond. When using recorded edition, stop timing when the subject engages the pause. Evaluate response on content. If response is vague, probe. Maximum time permitted per task--5 minutes.]

Say to the subject: I AM GOING TO ASK YOU TO LOOK UP SOME WORDS IN THE (WRITTEN) (RECORDED) EDITION OF THE DICTIONARY. TELL ME AS SOON AS YOU HAVE FOUND THE WORD. For subject's using the written edition, say: AS SOON AS YOU HAVE READ THE DEFINITION AND CAN REPEAT IT TO ME, STOP READING AND TELL ME WHAT THE WORD MEANS. For subject's using the recorded edition, say: AS SOON AS YOU HAVE HEARD THE DEFINITION AND CAN REPEAT IT TO ME, STOP THE PLAYER AND TELL ME WHAT THE WORD MEANS.

1A. Written/Recorded Find the word abysmal and tell me what it means. [Give cue card.]

Written: Braille page 19; large type page 73
Recorded: Part 3, 1st item after 5th indexed item--reverse search

Search technique used ____________________
Time to locate ____________________
Total time ____________________
Response ____________________

[too deep to be measured; bottomless]

2A. Written/Recorded Find the word aboard and tell me what it means. [Give cue card.]

Written: Braille page 8; large type page 66
Recorded: Part 2, 2nd indexed item--forward search

Search technique used ____________________
Time to locate ____________________
Total time ____________________
Response ____________________

[on board; on a ship, train, airplane, etc.]

Day Four

3A. Written/Recorded Find the word accurate and tell me what it means. [Give cue card.]

Written: Braille page 31; large type pages 82 and 83 [answer on 82]
Recorded: Part 6, 3rd item after 1st indexed item--forward search

Search technique used ____________________
Time to locate ____________________
Total time ____________________
Response ____________________

[precisely correct; exactly right as the result of care or pains]

4A. Written/Recorded Find the word adjoin and tell me what it means. [Give cue card.]

Written: Braille page 50; large type pages 94 and 95 [answer on 94]
Recorded: Part 8, 3rd item after 5th indexed item--reverse search

Search technique used ____________________
Time to locate ____________________
Total time ____________________
Response ____________________

[be next to; be close to; be side by side]

Day Four

Say to the subject: NOW, I AM GOING TO ASK YOU TO LOOK UP SOME WORDS IN THE (WRITTEN) (RECORDED) EDITION OF THE DICTIONARY. TELL ME WHEN YOU HAVE FOUND THE WORD. For subject's using the written edition, say: AS SOON AS YOU HAVE READ THE DEFINITION AND CAN REPEAT IT TO ME, STOP READING AND TELL ME WHAT THE WORD MEANS. For subject's using the recorded edition, say: AS SOON AS YOU HAVE HEARD THE DEFINITION AND CAN REPEAT IT TO ME, STOP THE PLAYER AND TELL ME WHAT THE WORD MEANS.

1B. Written/Recorded Find the word abyss and tell me what it means. [Give cue card.]

Written: Braille page 19; large type page 73
Recorded: Part 3, 2nd item after 5th indexed item--reverse search

Search technique used ____________________

Time to locate ____________________

Total time ____________________

Response ____________________

[A bottomless depth; a very deep crack in the earth]

2B. Written/Recorded Find the word abode and tell me its first meaning. [Give cue card.]

Written: Braille page 8; large type page 66
Recorded: Part 2, 1st item after 2nd indexed item--forward search

Search technique used ____________________

Time to locate ____________________

Total time ____________________

Response ____________________

[place to live in; dwelling; house]

Day Four

3B. Written/Recorded Find the word accursed and tell me its first meaning. [Give cue card.]

Written: Braille page 31; large type page 83
Recorded: Part 6, 4th item after 1st indexed item--forward search

Search technique used ____________________

Time to locate ____________________

Total time ____________________

Response ____________________

[under a curse]

4B. Written/Recorded Find the word adjourn and tell me its first meaning. [Give cue card.]

Written: Braille page 50; large type page 95
Recorded: Part 8, 4th item after 5th indexed item--reverse search

Search technique used ____________________

Time to locate ____________________

Total time ____________________

Response ____________________

[put off until a later time]

IF I ASKED YOU TO LOOK UP SOME MORE WORDS, IN WHICH EDITION OF THE DICTIONARY WOULD YOU PREFER TO DO IT? ____________________

WHY?

Day Five

Encyclopedia Test

Sequence _______

[Two separate times will be required for each of these tasks: one being the time required to locate the item and the other being the time to answer the question about it. Timing for the location part of each task will start immediately after the subject is told the item he is to locate and given the cue card. For subject's using the written edition, timing will stop when the subject says he has located the item. For subject's using the recorded edition, timing will stop when the subject engages the pause. Timing for the second part of each task, answering the question, will start as soon as the question is stated. Timing will stop when the subject starts to respond. Maximum combined time for two tasks--5 minutes.]

Say to the subject: TODAY, I AM GOING TO ASK YOU TO LOOK UP SOME ITEMS IN THE (WRITTEN) (RECORDED) EDITION OF THE ENCYCLOPEDIA. For subject's using the written edition, say: TELL ME AS SOON AS YOU HAVE FOUND THE ITEM. THEN, I WILL ASK YOU A QUESTION ABOUT IT. YOU WILL HAVE TO READ THE ARTICLE TO FIND THE ANSWER. HOWEVER, YOU MAY NOT HAVE TO READ THE WHOLE ARTICLE ABOUT THE ITEM. STOP READING AS SOON AS YOU HAVE FOUND THE ANSWER TO THE QUESTION AND TELL ME. For subject's using the recorded edition, say: AS SOON AS YOU HAVE FOUND THE ITEM, STOP THE RECORD PLAYER. THEN, I WILL ASK YOU A QUESTION ABOUT IT. YOU WILL HAVE TO LISTEN TO THE ARTICLE TO FIND THE ANSWER. HOWEVER, YOU MAY NOT HAVE TO LISTEN TO THE WHOLE ARTICLE ABOUT THE ITEM. STOP THE PLAYER AS SOON AS YOU HAVE FOUND THE ANSWER AND TELL ME.

1A. Written/Recorded Look up the item thymol. [Give cue card.]

Written: Braille page 795; 12-point page 212
Recorded: Part 4, 2nd indexed item--forward search

Search technique used ____________________

Time to locate ____________________

Question: What more powerful antiseptic is thymol sometimes used to replace?

Time to respond ____________________

Response ____________________

[iodoform]

Day Five

2A. Written/Recorded Look up the item Tilden, Samuel Jones. [Give cue card.]

Written: Braille pages 831-832 [answer on 831]; 12-point page 223
Recorded: Part 9, 1st item after 2nd indexed item--forward search

Search technique used ____________________

Time to locate ____________________

Question: Samuel Tilden became famous as a leader of an attack on the "Tweed Ring" of New York City. Through what kind of schemes had this ring stolen millions of dollars?

Time to respond ____________________

Response ____________________

[city improvement]

3A. Written/Recorded Look up the item tiger lily. [Give cue card.]

Written: Braille pages 828-829 [answer on 828]; 12-point page 223
Recorded: Part 8, 1st item after 4th indexed item--reverse search

Search technique used ____________________

Time to locate ____________________

Question: How tall does the tiger lily's stem often grow?

Time to respond ____________________

Response ____________________

[5 or 6 feet]

4A. Written/Recorded Look up the item Tientsin [Give cue card.]

Written: Braille pages 820-821 [answer on 820]; 12-point page 221
Recorded: Part 7, 3rd indexed item (2nd from end of part)--reverse search

Search technique used ____________________

Time to locate ____________________

Question: Tientsin is how many miles southeast of Peiping?

Time to respond ____________________

Response ____________________

Day Five

Say to the subject: NOW, I AM GOING TO ASK YOU TO LOOK UP SOME ITEMS IN THE (WRITTEN) (RECORDED) EDITION OF THE ENCYCLOPEDIA. For subject's using the written edition, say: TELL ME AS SOON AS YOU HAVE FOUND THE ITEM. THEN, I WILL ASK YOU A QUESTION ABOUT IT. YOU WILL HAVE TO READ THE ARTICLE TO FIND THE ANSWER. HOWEVER, YOU MAY NOT HAVE TO READ THE WHOLE ARTICLE ABOUT THE ITEM. STOP READING AS SOON AS YOU HAVE FOUND THE ANSWER TO THE QUESTION AND TELL ME. For subject's using the recorded edition, say: AS SOON AS YOU HAVE FOUND THE ITEM, STOP THE RECORD PLAYER. THEN, I WILL ASK YOU A QUESTION ABOUT IT. YOU WILL HAVE TO LISTEN TO THE ARTICLE TO FIND THE ANSWER. HOWEVER, YOU MAY NOT HAVE TO LISTEN TO THE WHOLE ARTICLE ABOUT THE ITEM. STOP THE PLAYER AS SOON AS YOU HAVE FOUND THE ANSWER AND TELL ME.

1B. Written/Recorded Look up the item thymol. [Give cue card.]

Written: Braille page 795; 12-point page 212
Recorded: Part 4, 2nd indexed item--forward search

Search technique used ____________________

Time to locate ____________________

Question: Thymol cannot be relied on to do what?

Time to respond ____________________

Response ____________________

[kill all germs]

2B. Written/Recorded Look up the item Tilden, Samuel Jones. [Give cue card.]

Written: Braille pages 831-832 [answer on 831]; 12-point page 223
Recorded: Part 9, 1st item after 2nd indexed item--forward search

Search technique used ____________________

Time to locate ____________________

Question: Where was Samuel Tilden born?

Time to respond ____________________

Response ____________________

[New Lebanon, New York]

Day Five

3B. Written/Recorded Look up the item tiger lily. [Give cue card.]

Written: Braille pages 828-829 [answer on 828]; 12-point page 223
Recorded: Part 8, 1st item after 4th indexed item--reverse search

Search technique used ____________________

Time to locate ____________________

Question: What shape are the tiger lily's leaves?

Time to respond ____________________

Response ____________________

[lance-shaped]

4B. Written/Recorded Look up the item Tientsin. [Give cue card.]

Written: Braille pages 820-821 [answer on 820]; 12-point page 221
Recorded: Part 7, 3rd indexed item (2nd from end of part)--reverse search

Search technique used ____________________

Time to locate ____________________

Question: Tientsin is near the mouth of what river?

Time to respond ____________________

Response ____________________

[Hai]

IF I ASKED YOU TO LOOK UP SOME MORE ITEMS, IN WHICH EDITION OF THE ENCYCLOPEDIA WOULD YOU PREFER TO DO IT? ____________________

WHY?

APPENDIX D

TEST TASKS

Criteria Used in Selecting Test Items

Dictionary

1. Pairs of items comprised of adjacent items of similar length. Common words were avoided.
2. Pairs of items having distinct meaning (dissimilar items) were selected.
3. Words selected had definitions clearly stated in a few words.
4. Pairs of items were selected coming from different parts of the recording meaning they were distributed throughout the text.
5. In the recorded edition, an equal number of pairs were selected that would be most efficiently found through forward and reverse search.
6. One member from the first four pairs (1/8 = 12 1/2%) was an indexed item to reflect the 15% of the total number of items that were indexed.

Encyclopedia

1. Items selected were ones for which two questions could be asked where answers to the questions were specifically stated in the text in a few words.
2. Items selected were ones where answers to the two questions for the item required a similar amount of the text to be covered.
3. Items selected were those not containing many foreign nor difficult words.
4. Items selected were ones for which the overall length was not too long.
5. Items were selected coming from different parts of the record meaning they were distributed throughout the text. No item was selected from Part 2 of the record as that part was primarily devoted to the topic "thrift."
6. In the recorded edition, an equal number of items were selected that would be most efficiently found through forward and reverse search.
7. Two of the items selected were indexed items (2/4 = 50%) to reflect the 41% of the total which are indexed items.
8. Items selected were those similarly written-up in the braille (1959) and 12-point print (1964) editions.

Dictionary--Test Items

(adjacent pairs of words)

	Item	Time to Locate	Position	Task	Correct Response
1A.	abysmal	58" (r)	Part 3, 1st item after 5th indexed item	define	too deep to be measured; bottomless
1B.	abyss	39" (r)		define	a bottomless depth; a very deep crack in the earth
2A.	aboard	29" (f)	Part 2, second indexed item	define	on board; on a ship, train, airplane, etc.
2B.	abode (1st)	37" (f)		define	place to live in; dwelling; house
3A.	accurate	22" (f)	Part 6, 3rd item after 1st indexed item	define	precisely correct; exactly right as the result of care or pains
3B.	accursed (1st)	36" (f)		define	under a curse
4A.	adjoin	40" (r)	Part 8, 3rd item after 5th indexed item	define	be next to; be close to; be side by side
4B.	adjourn (1st)	47" (r)		define	put off until a later time

f indicates search was forward from beginning of part
r indicates search was reverse from end of part

NOTE: In dictionary practice it was necessary to explain that a word may have several meanings (i.e., first meaning).

Pages Where Information To Do Tasks Is Found

Task	Braille Page	Large Type Page
1A	19	73
1B	19	73
2A	8	66
2B	8	66
3A	31	82-83 [answer on 82]
3B	31	83
4A	50	94-95 [answer on 94]
4B	50	95

Encyclopedia--Test Items

THYMOL--write-up very similar in two editions

Record: Part 4, 2nd indexed item [23" (f) to locate]
Braille page 795
12-point page 212

1A. What more powerful antiseptic is thymol sometimes used to replace?

answer: iodoform
49 words to answer--braille and 12-point editions

1B. Thymol cannot be relied on to do what?

answer: kill all germs
62 words to answer--braille and 12-point editions

TILDEN, SAMUEL JONES--partially rewritten in latter edition, however, similar through where answers to questions are found--total length of braille edition's item is 173 words; total length of 12-point edition's item is 202 words plus a picture with a 2 word caption

Record: Part 9, 1st item after 2nd indexed item [35" (f) to locate]
Braille pages 831-832 [answer on 831]
12-point page 223

2A. Samuel Tilden became famous as a leader of an attack on the "Tweed Ring" of New York City. Through what kind of schemes had this ring stolen millions of dollars?

answer: city improvement
46 words to answer in braille edition
41 words to answer in 12-point edition

2B. Where was Samuel Tilden born?

answer: New Lebanon, New York
54 words to answer in braille edition
53 words to answer in 12-point edition

---

f indicates search was forward from beginning of part
r indicates search was reverse from end of part

NOTE: Instructions to the subjects should tell them to stop reading or listening as soon as they have found the information to answer the question.

TIGER LILY--write-up very similar in two editions

Record: Part 8, 1st item after 4th indexed item [59" (r) to locate]
Braille pages 828-829 [answer on 828]
12-point page 223

3A. How tall does the tiger lily's stem often grow?

answer: 5 or 6 feet
79 words to answer in braille edition
83 words to answer in 12-point edition

3B. What shape are the tiger lily's leaves?

answer: lance-shaped
83 words to answer in braille edition
86 words to answer in 12-point edition

TIENTSIN--write-up very similar in two editions

Record: Part 7, 3rd indexed item (2nd from end of part) [40" (r) to locate]
Braille pages 820-821 [answer on 820]
12-point page 221

4A. Tientsin is how many miles southeast of Peiping?

answer: 85
49 words to answer in braille edition
53 words to answer in 12-point edition

4B. Tientsin is near the mouth of what river?

answer: Hai
57 words to answer in braille edition
61 words to answer in 12-point edition

APPENDIX E

RESULTS OF ANALYSES OF VARIANCE

Table 3

Means and Standard Deviations for All Variables Differing Significantly at the .05 and .01 Levels in Dictionary Use

	Total location times (sec.) M	SD	Accuracy of locations M	SD	Accuracy of responses M	SD
Reading type (RT)						
Braille	537.6	348.4	-	-	-	-
Large type	382.3	262.3	-	-	-	-
Grade level (GL)						
4-6	675.0	331.7	2.7	1.3	2.6	1.3
7-9	417.6	284.0	3.6	0.6	3.6	0.8
10-12	287.2	190.5	3.9	0.3	3.9	0.3
Medium (M)						
Written	304.1	313.1	3.6	1.0	-	-
Recorded	615.8	233.7	3.2	1.0	-	-
RT x M						
Br./Wr.	401.2	375.5	-	-	-	-
Br./Rec.	674.0	263.6	-	-	-	-
LT/Wr.	207.1	202.2	-	-	-	-
LT/Rec.	557.5	189.1	-	-	-	-
GL x M						
4-6/Wr.	536.3	376.7	-	-	-	-
4-6/Rec.	813.7	215.0	-	-	-	-
7-9/Wr.	237.9	247.0	-	-	-	-
7-9/Rec.	597.3	192.9	-	-	-	-
10-12/Wr.	138.2	123.9	-	-	-	-
10-12/Rec.	436.2	110.0	-	-	-	-

Note. These data are for the combined or total score for the four tasks performed by each subject using each medium. The maximum time permitted for the four location tasks was 1,200 seconds while the maximum number of locations and responses possible were four.

Table 4

Means and Standard Deviations for All Variables Differing Significantly at the .05 and .01 Levels in Encyclopedia Use

	Location times (sec.)		Accuracy of locations		Accuracy of responses	
	M	SD	M	SD	M	SD
Reading type (RT)						
Braille	534.8	323.3	3.2	1.2	-	-
Large Type	352.0	242.8	3.7	0.8	-	-
Grade level (GL)						
4-6	648.6	354.5	2.8	1.5	2.1	1.5
7-9	410.4	240.0	3.6	0.8	3.3	1.0
10-12	271.2	125.0	4.0	0.2	3.8	0.5
Medium (M)						
Written	378.8	333.0	-	-	-	-
Recorded	508.0	247.4	-	-	-	-
RT x Order (O)						
Br./W-R	-	-	2.7	1.5	2.4	1.6
Br./R-W	-	-	3.7	0.6	3.2	1.2
LT/W-R	-	-	3.9	0.2	3.6	0.7
LT/R-W	-	-	3.5	1.2	3.1	1.4
GL x M						
4-6/Wr.	602.5	421.7	-	-	-	-
4-6/Rec.	694.8	283.4	-	-	-	-
7-9/Wr.	352.6	267.5	-	-	-	-
7-9/Rec.	468.2	203.9	-	-	-	-
10-12/Wr.	181.3	74.6	-	-	-	-
10-12/Rec.	361.1	97.4	-	-	-	-
RT x GL x O						
Br./4-6/W-R	-	-	1.2	1.0	0.8	1.0
Br./4-6/R-W	-	-	3.5	0.8	2.7	1.5
LT/4-6/W-R	-	-	3.8	0.4	3.3	0.8
LT/4-6/R-W	-	-	2.7	1.8	1.7	1.6
Br./7-9/W-R	-	-	3.0	1.3	2.7	1.5
Br./7-9/R-W	-	-	3.5	0.5	3.0	1.1
LT/7-9/W-R	-	-	4.0	0.0	3.8	0.4
LT/7-9/R-W	-	-	4.0	0.0	3.7	0.5
Br./10-12/W-R	-	-	4.0	0.0	3.7	0.5
Br./10-12/R-W	-	-	4.0	0.0	4.0	0.0
LT/10-12/W-R	-	-	4.0	0.0	3.7	0.8
LT/10-12/R-W	-	-	3.8	0.4	3.8	0.4

Note. These data are for the combined or total score for the four tasks performed by each subject using each medium. The maximum time permitted for the four location tasks was 1,200 seconds while the maximum number of locations and responses possible were four.

STUDY II

EVALUATION OF A MODIFIED INDEXING DISC SYSTEM AS A REFERENCE SOURCE

Carson Y. Nolan and June E. Morris

Abstract

Following the generally positive evaluation of an indexing disc system as a reference source, the system was redesigned for production. The redesigned system was then subjected to field testing, slightly modified, then tested again. Subjects in both field trials were legally blind students who were first taught to use the system and then tested on their skill using it. Test tasks required locating specific items in a recorded sample from an encyclopedia and were scored in terms of accuracy and time. On the first field trial, accuracy scores for braille and large type subjects were 78% and 86%, respectively. Mean location times for items located correctly were 103 seconds for subjects using braille and 97 seconds for those using large type of which 42% and 35% of the time spent by the two, respectively, was in using the written index. This was considered too great; therefore, the written indexes and the indexing on the records were modified. On the second field trial, subjects using braille and large type found 80% and 81% of the items correctly, respectively. The average times required for those items located correctly were 115 seconds for subjects using braille, of which 29% was spent using the written index, and 92 seconds for those using large type, of which 27% was spent using the written index. The greatest single problem experienced by subjects was in determining the correct alphabetical position of items.

STUDY II

EVALUATION OF A MODIFIED INDEXING DISC SYSTEM AS A REFERENCE SOURCE

Study I described the results of the initial evaluation of an Aural Study System as a source of recorded references for visually handicapped students. Students in grades 4-12 were successful in learning to use the system to locate items on recorded versions of an encyclopedia and a dictionary accurately and within practical time limits.

The success of this effort stimulated interest in further development of this system and its application in publication of a recorded encyclopedia. Consequently, the system was redesigned for production. Production engineering included redesign of the player, the record, and the written indexes. The goal of this report is to describe the revised system and the results of two field trials that were made.

FIELD TRIAL 1

Method

Purpose

The purpose of the field trial was to determine if visually handicapped students could learn to use the system readily, if they could locate items accurately within practical time limits, and to check the reliability of two production models of the player. Students received 3-hours training in use of the system and then were tested on time and accuracy for location of items.

Subjects

Students participating as subjects included 14 braille readers and 11 large type readers. One attended the Kentucky School for the Blind while the remainder attended the Missouri School for the Blind. The subjects were all legally blind. All students were in the middle IQ range and were enrolled in regular academic programs. Braille students participating were required to have used braille as their primary reading medium for at least 1 year. Sex, reading medium, and grade distribution are given in Table 1.

Table 1

Sex, Reading Medium, and Grade Distribution for Subjects

	Male	Female
Braille readers		
Grades 7-9	3	3
Grades 10-12	6	2
Large type readers		
Grades 7-9	2	4
Grades 10-12	4	1

The original design of the study called for three subjects from each grade for each reading medium for a total of 36. However, a flu epidemic at the Missouri School caused 11 subjects to fall out of the study. Subsequently, the experimenters decided, on the basis of the data obtained, to terminate Field Trial 1 and to revise the written indexes and the records for an additional field trail.

Materials

Record players. Two production models of the record players were built. As before, the players utilized a specially designed record with two channels recorded in each groove that could be played independently. One channel (recorded at 66 2/3 rpm) contained the index information and the second channel (recorded at 8 1/3 rpm) contained the text. The player is pictured in Figure 1.

The modified record player had the following features: (a) forward and backward turntable search action, (b) instantaneous turntable stop-start, (c) capability to play the two record channels independently at the appropriate speeds, (d) a continuously variable playing speed capability ranging from 6 1/4 to 16 2/3 rpm, (e) a tone arm having a retractable pickup cartridge incorporating a mechanism for positively identifying the record edge and featuring stylus pressure light enough to prevent record damage through mishandling the tone arm, (f) a headphone jack, (g) a foot control for remote operation of the three modes; play, fast reverse, and stop, and (h) an automatic cutoff when the tone arm was in its rest position or at the end of a record. Of special interest was the index feature which allowed for exact location of any of 30 equally spaced points across the radius of a 12-inch record. Any given point could be selected by depression of any letter-number combination from a keyboard consisting of six lettered keys and five numbered keys.

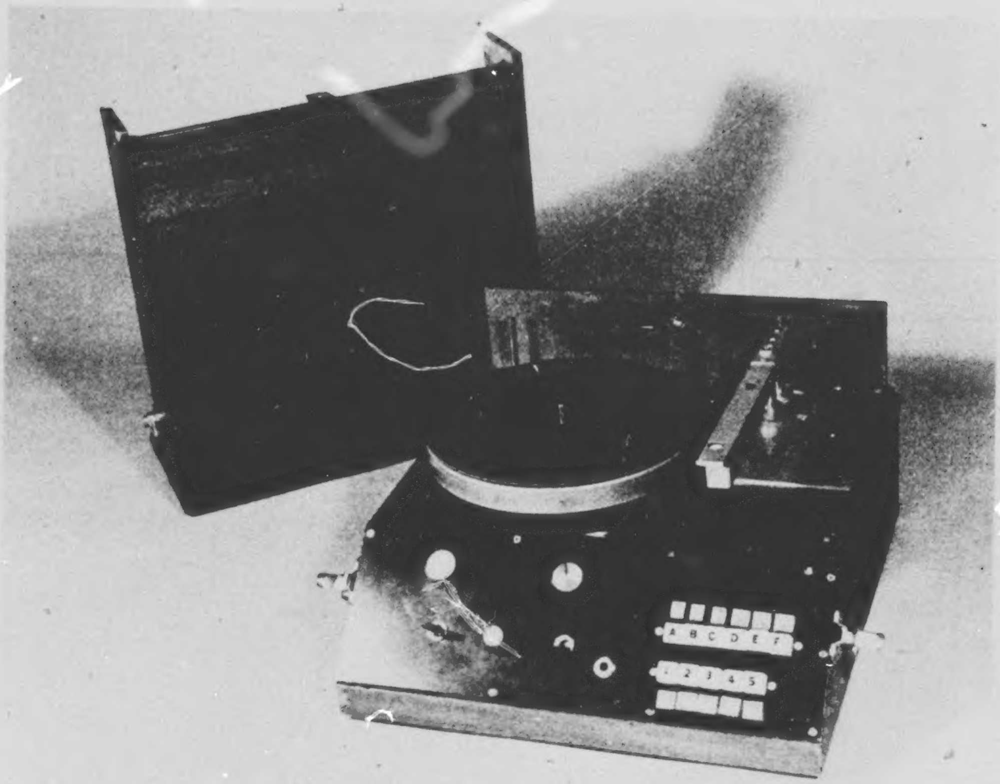

Figure 1. Modified indexing disc player

To find a specific subject in a book, the user would first have to know the appropriate index term (page number or alphabetical listing) under which the item would be located. By entering appropriate lists, he could identify the correct record and record side. Next, he would have to survey braille or large type index lists on the record jacket or elsewhere to identify the spoken index entry associated with the index point occurring immediately before the desired item. He would then depress the letter-number key combination associated with the spoken index entry, depress the lever on top of the tone arm, which retracted the stylus, and swing the tone arm toward the center of the record. At the keyed point, operation of a detent automatically would damp the tone arm movement and, simultaneously, activate a tone. The user would then lower the stylus to the record by releasing the lever on the tone arm. Next, he would engage the fast forward by flipping the appropriate switch. In this mode the index channel of the record would be searched at 66 2/3 rpm until the desired spoken index term was heard.

At this point the user would disengage the fast forward search control causing the player to instantaneously return to its regular play mode at the place where the start of the desired material could be heard. If desired, the user could search within sections, such as pages, for specific facts at a faster than normal rate through use of the player's variable speed capability.

Recorded encyclopedia. Six hours of material was recorded from the 1973 edition of The World Book Encyclopedia (Field, 1973). This material was reproduced on three 9-inch flexible stereophonic records with 1 hour of recorded material appearing on each side. The encyclopedia content was recorded on one stereo channel at 8 1/3 rpm. Index information was recorded on the second channel for reproduction at 66 2/3 rpm.

As indicated previously, the player was designed so that the recorded index channel could be searched at 66 2/3 rpm. When the appropriate recorded index term was heard, the user could release the fast-forward switch and immediately hear the recorded reference item announced on the content channel. To achieve this degree of sychronization, the initiation of the announcement of the reference on the index channel preceded its announcement on the content channel by approximately 5 seconds. In either case, the announcement of the reference was preceded by a series of clicks that served as an attention arousing mechanism.

Prior to recording the encyclopedia material, it was edited. Where quotations appeared in the text, these were noted by the insertion of the words "quote" and "close quote" on the recorded version. The editing task also included making decisions as to which words on the content channel should be spelled. All other than common entry words were spelled after being pronounced on the content channel. In general, words spelled within articles included proper names, foreign words, and all important words in the text that were not common enough to be recognized readily by younger users. No items were spelled on the index channel.

The content of sides of the three records is described in Table 2. For each record side, this table gives the range of content included; the number of references included; the number of references that offered no information, but were referrals to other items; the number of items recorded on the spoken index channel; the number of items that could be located directly through the input to the keyboard on the player; and the number of nonindexed items.

Although it was possible to index 30 points by keyboard input on a 12-inch record, it was only possible to index 16 on a 9-inch record. The number of items that actually were indexed varied from 11 to 14. The disparity between the number possible and the numbers actually used resulted from the fact that the points on a record were fixed as determined by keyboard combinations, and often longer articles would extend through two or more.

Table 2

Record Side Content

	Content range	Number of references	Number of cross references	Number of items in spoken index	Number of items located by keyboard	Nonindexed items
Record 1						
Side 1	Bear Tree-Beaver (Body)	39	13	31	13	8
Side 2*	Beaver (Life)-Bee (Life)	30	8	22	14	8
Record 2						
Side 3	Boone, D.-Border Patrol	26	8	19	11	7
Side 4	Border State-Boston (Intro.)	39	10	30	14	9
Record 3						
Side 5	Bulbul-Bumblebee	34	9	27	14	7
Side 6*	Buna-Burke, A. A.	44	12	34	13	10

*Side began with continuation of article from preceding side.

Written indexes. Indexes for each record were printed in braille and large type (18 point). The indexes listed all references announced in the spoken index channel of the record. These references were grouped on the written index by the keyboard letter-number combination which they followed. These combinations were printed to the right of the reference entry with which they were associated. An example of a written index appears in Appendix A.

Cue cards. Before students were requested to find reference items during both training and testing, they were presented with a cue card containing the reference item printed in braille or large type as appropriate. This was done to diminish variation between subjects which might result from subject differences in ability to spell.

Procedure

Each subject was scheduled to work individually with one experimenter for four 50-minute periods on consecutive school days. The first 3 days were spent training subjects to use the recorded encyclopedia and the last day was spent in testing their proficiency of use. The sequence of activities for both training and testing is described in detail in the Subject Data Record included in Appendix B. As the name suggest, this form allowed for recording performance data at all stages of training and testing.

Training was initiated by describing the purposes of the study and determining the subjects willingness to participate. Next the form and uses of the encyclopedia were reviewed. This was followed by familiarization training in the configuration of the record player, design of the record, design of the written indexes, and use of the indexing capabilities of the combined system.

On the second training day, all components and their uses were reviewed and practice begun on finding specific references using sides one and two. The procedure followed was to name the reference to be located and present the subject with the cue card containing the reference printed in braille or large type. The subject was asked to verbalize how he would go about finding the reference. His verbalization was remediated as required and then he attempted to locate the reference on the recording. Practice continued during the third day using sides three and four. During training subjects had opportunity to locate up to 65 references using one of three methods for location as described in the training routine. These methods described how to find items listed on the written index that could be located directly by going to a keyed point on the record, items that were listed on the written index but had to be located using the spoken index after going to a keyed point, and items not in the written or spoken indexes that had to be located first using a keyed point, next the spoken index, and then through listening to the content channel. Practice items were arranged to assure similar amounts of practice with each of the three methods.

Proficiency testing or the fourth day required the subject to locate independently 12 references using sides five and six. Each of the three possible methods of search was tested by four items. As in training, each reference was announced orally by the examiner and presented in the appropriate written form on a cue card. The examiner recorded the time spent using the written index, the total search time, and the accuracy of location. Comments were recorded as relevant. If the subject failed to find the reference within 4 minutes, he was stopped and the next test item announced.

Results

Results of the trial showed that subjects from grades 7-12 could learn to use the system to locate references adequately in the training time allowed. Table 3 gives the percentage of references located accurately, the average time for location of references, and the percentage of time spent searching the written indexes for both braille and large type readers. The location accuracy scores of 78% for braille readers and 86% for large type readers are acceptable at this level of practice and are closely comparable to the scores of 78% and 92% obtained with the earlier version of the system described in Study I. The mean location times for items located correctly of 103 seconds for braille and 97 seconds for large type are also close to the scores of 108 seconds and 86 seconds found previously. The difficulty noted in the earlier study in use of the written indexes is documented in this study by the findings that this activity comprised 42% of total location time for braille readers and 35% for readers of large type.

When accuracy of location is broken down by search method (degree of indexing) as in Table 4 results appear more favorable. Accuracy of location of directly keyed items was 91% and 89% for braille and large type readers respectively. Accuracy for auditory indexed, but not keyed items was as high, being 89% and 95%. Accuracy for nonindexed items dropped to 54% for braille readers and 75% for large type readers. However, since items of this type on the six record sides used ranged from only 21% to 27% of the total, this last level of performance is not unacceptable. Sixty-seven percent of the total number of location errors made (55) were on nonindexed items.

Table 3

Mean Accuracy and Time Scores for Locating Recorded References

	Braille readers	Large type readers
Number of subjects	14	11
References located correctly	78%	86%
Average location time (seconds)	103	97
Percentage of time on written index	42%	35%

Table 4

Mean Correct Locations by Search Method

	Braille readers	Large type readers
Number of students	14	11
Keyed items	91%	89%
Auditorily indexed,not keyed	89%	95%
Nonindexed items	54%	75%

Of the 55 location errors, 40% (22) were caused by lack of alphabetical skills in written index search. The remainder of the errors was fairly evenly distributed among 11 other causal effects. A possible problem area identified was in the location of subheadings of major articles. Of 25 such attempts, errors were made on 16% (4).

A number of minor mechanical and operational problems were identified during the field use of the two production models. For example, carrying the players by the handle at the back put them in a vertical position. Due to faults in mounting the drive motor, vertical carrying caused the motors to tilt out of their intended position which, in turn, caused the belts to slip off when the player was operated in its normal position. A list of these minor problems was made and submitted to the engineering staff for correction.

Discussion

As in Study I, subjects were able, after a short learning period, to learn to operate the system to find references in a recorded encyclopedia within practical time limits and levels of accuracy. Times for location and accuracy of location were comparable to those attained in the earlier study.

As was the case in Study I and also in an earlier study of the feasibility of indexing textbooks (Morris, Nolan, & Brothers, 1973), a major source of error was lack of skill in alphabetizing. However, lack of opportunity to use alphabetical classifications, particularly in the case of braille readers, may be a cause of this problem.

Problems in alphabetizing and slow reading speeds appear the main factors involved in the great portion of total search time devoted to using the written indexes. It would appear extremely desirable to shorten this time. If the written indexes could be shortened in length, while at the same time made more useful or legible, savings in time might be achieved.

The discussions in Study I relative to the practicality and cost-effectiveness of recorded references apply equally to this revised version of the system. However, it is anticipated that costs for the more sophisticated player used in this study might be about 40% greater than those projected in the discussion in Study I.

Conclusions

Students appeared able, after brief training, to use the modified system to find references in a recorded encyclopedia accurately and in reasonable time. It appeared desirable to undertake further field testing after correcting several minor mechanical and operational problems and after modifying the form of the written indexes.

FIELD TRIAL 2

Method

Purpose

The purpose of this study was to replicate Field Trial 1 using a shorter version of the written indexes. It was expected that use of shorter indexes would reduce that portion of total location time devoted to index use.

Subjects

Subjects included 13 braille readers and 13 large type readers from grade 7-post-graduate high school (PG). All subjects were legally blind. They were randomly chosen from regular academic classrooms. Of these, 10 were enrolled in the Kentucky School for the Blind, 11 in the Maryland School for the Blind, and 5 in the Indiana School for the Blind. Sex, reading medium, and grade distributions are given in Table 5.

Table 5

Sex, Reading Medium, and Grade Distribution for Subjects

	Male	Female
Braille readers		
Grades 7-9	6	1
Grades 10-PG	4	2
Large type readers		
Grades 7-9	5	2
Grades 10-PG	2	4

Materials

Record players. These were the same players used in Field Trial 1 with slight modifications made to overcome the mechanical and operational problems previously encountered.

Recorded encyclopedia. The three records used in this study were identical with those described for trial 1 with one exception. In the present trial, each reference included on each record was assigned a number. These numbers started at one and were continued from the first side through the second. The numbers of all references were announced on the index channel as well as the names of most of the references as indicated in Table 2. However, the number of items that could be indexed directly through the keyboard varied slightly from Table 2. The warning clicks appearing in the index channel in trial 1 were eliminated; however, these were retained on the content channel.

Written indexes. Indexes were again made available in braille and large type. However, only references directly accessible through keyboard positions were listed. This reduced the length of the indexes by approxiamtely 50%. Format was changed so that references were listed on the left, with the identification number and the keyboard index code printed in that order to the right. Where a reference was a major subheading of a long article, it was identified by a number and a letter; the number being that of the main article (e.g., Bear--body.....2a would be the first major part of the article Bear). An index example is included in Appendix C.

Cue cards. Cards giving the correct spelling for each reference used in training or testing were made available in braille and large type as before.

Procedure

The procedure used in this study was identical to that used in trial 1 with three exceptions. The Subject Data Record describing the training was modified to accomodate the changes in index length and format; to include information on the numbering of all references, and some references used in training were changed. The design of the test was the same; however, some of the references designated as test items were different. The revised Subject Data Form and Test can be found in Appendix D.

Results

As in Field Trial 1, results demonstrated that students could learn to use the system to locate reference items adequately in the training time allowed. Data describing student accuracy of location of references and the times required appear in Table 6.

The major interest in this trial was the effect of the modification of the written indexes and the assignment of numbers to the references on location time and accuracy. Comparison of data in Tables 3 and 6 show little difference in accuracy. The accuracy scores for braille readers are 78% and 80%, respectively, while those for large type readers are 86% and 81%. Consequently, no trend in changes in accuracy is discernible.

Table 6

Mean Accuracy and Time Scores for Correct Location for Recorded References

	Braille readers	Large type readers
Number of students	13	13
References located correctly	80%	81%
Average location time (sec.)	115	92
Percentage of time on written index	29%	27%

Comparison of the average location times for items located correctly leads to a similar conclusion. Comparisons between Trial 1 and Trial 2 are 103 seconds and 115 seconds for braille readers and 97 seconds and 92 seconds for large type readers. Since no efforts were made to match the samples between trials the comparability of these data is not known.

Of greater interest, however, are the data on time spent using the written indexes. Comparison of Trail 1 and Trial 2 show reductions in percentage of search time devoted to index use. The figures are 42% and 29% for braille readers and 35% and 27% for large type readers. Average times spent on the index for the two trials are 43 seconds and 33 seconds for braille readers and 34 seconds and 25 seconds for large type readers. Consequently, it appears that the changes made in the written indexes did increase the efficiency of the search process.

Comparison of Tables 4 and 7 (which reflect the accuracy with which items indexed by the three methods used in the study were found) reveals no trends in changes of accuracy because of the index change. This, of course, reflects the overall comparability previously described.

Table 7

Mean Correct Locations by Search Method

	Braille readers	Large type readers
Number of students	13	13
Keyed items	98%	100%
Auditorily indexed, not keyed	81%	77%
Nonindexed items	60%	65%

Of a total 62 location errors, 35% were caused by errors in alphabetizing which was the greatest single source of errors. This compares favorably with the 40% error rate from this source when using the longer indexes. The location of subheadings of major articles proved to be a major problem. Of 26 such attempts, errors were made on 46% (12).

Discussion

Once again the usability of a recorded encyclopedia was demonstrated. Students located references within reasonable time limits with acceptable accuracy.

The evidence accumulated during Trial 2 is indicative of the impact upon search time of written index and record format design. Cutting the length of the written index by 50% and pairing every reference entry with a number that was recorded on the spoken index channel reduced search times by a small but practically significant amount.

As previously mentioned, slow reading rates and poorly developed alphabetizing skill characterize visually impaired students. Study of written index design along the dimensions of length, complexity, and page layout appears to have great potential for identifying written index formats which would serve to offset or minimize the efforts of these persistant skill deficits.

Techniques of auditory indexing, to this time, have been only superfically explored. Additional study should result in improvement in this area. Study of this nature is planned as part of this project.

Conclusions

The usability of a recorded encyclopedia by blind students was once more demonstrated. Modification of the design of the written index and record format can result in reduced search time. Further research in this area and in design of auditory indexing is desirable.

References

Field Enterprises Educational Corporation. *The world book encyclopedia* (Vol. 2). Chicago: Author, 1973.

Morris, J. E., Nolan, C. Y., & Brothers, R. J. *Aural study systems for the visually handicapped: Field trial of the Aural Study System: Interim progress report no. 10* [Project No. 8-0046; Grant No. OEG-C-8-080046-2670(032)]. Louisville, Ky.: American Printing House for the Blind, 1973. (ERIC Document Reporduction Service No. ED 078 620)

APPENDIXES

APPENDIX A

FIELD TRIAL 1

SAMPLE OF WRITTEN INDEX

Bean Tree through Section Three of Bee

Side One

C-5	Bean Tree Bear
D-1	Body of a Bear Life of a Bear
D-2	Kinds of Bears
D-5	Bear, Great and Little Bearbaiting
E-1	Beard Beard Beard, Daniel
E-2	Beardsley, Aubrey Beardtongue
E-3	Bearing
E-4	Bearing Circle Beasts of Burden Beat Beatitudes
E-5	Beatles Beatrice Portinari Beatty, David Beau Brummell
F-1	Beaufort Beaufort Scale Beaumont
F-2	Beaumont, Francis Beaumont, William Beauregard
F-3	Beauty Beauty Care Beaver
F-4	Body of a Beaver

Side Two

C-5	Life of a Beaver
D-2	Beaver College
D-3	Bebel, August Bebop Becker, Carl
D-4	Becket, Saint Thomas À
D-5	Beckett, Samuel Beckley Beckwourth, James
E-1	Becquerel
E-2	Bed
E-3	Bedbug
E-4	Bede Bedford, Duke of
E-5	Bedlam Bedlington Terrier Bedloe's Island
F-1	Bedstraw Bee
F-2	Introduction and Interesting Facts
F-3	Honeybee Colony
F-5	Life of the Honeybee

APPENDIX B

FIELD TRIAL 1

SUBJECT DATA RECORD FORM

FIELD TEST OF PRODUCTION PROTOTYPE RECORD PLAYER FOR RECORDED ENCYCLOPEDIA

SUBJECT DATA RECORD

Name ______________________________ Sex _____________ IQ range 80-120 __________ (check)

School ______________________________ Grade ______ Experimenter __________________

Week of ______________________________ Schedule ______________________________

Reading Medium ____________________ Number of years using ____________________

If braille, any useful vision? ____

Has subject ever used an encyclopedia? __________________________________

Daily Record

Day One

Number of practice items attempted:

Keyboard use:

Index use:

Other:

Day Two

Number of practice items attempted:

Keyboard use:

Index use:

Other:

Day Three

Number of practice items attempted:

Keyboard use:

Index use:

Other:

Day Four

Number of test items completed correctly

Keyboard use:

Day Four continued

Index use:

Other:

General Observations

Daily Starting Setup

All equipment and materials required for the day should be placed on a table providing ample space.

Two chairs--one for the subject and one for the experimenter

Good lighting in testing environment where large type subjects are to work

Orientation of directions--the user

- The player should be set up ready for use (cork padding on turntable)
  - Plugged into an electrical outlet
  - Lid off and placed behind or behind and to the side of player
  - Speaker plugged into speaker jack at back of player
  - Tone arm swung all the way to the right in rest position
  - Power/volume control
    - Day 1--in off position (full counterclockwise)
    - Days 2, 3, and 4--power on, volume set at moderate
  - Tone control--set midway between treble and bass
  - Variable speed control--pushed in; therefore, not engaged and rotated midway between fastest and slowest
  - Keyboard--no keys depressed
  - Pause control--released
  - Foot control--not present
  - Headphones--not present
- The materials required each day are one record, its index, and the corresponding set of cue cards.
  - Days 1 and 2--the record containing sides one and two
  - Day 3--the record containing sides three and four
  - Day 4--the record containing sides five and six
    - The appropriate record should be placed on the table at the left side of the record player with the odd side up, oriented so that the odd number is positioned for reading.
    - The record's written index should be placed on the table at the right of the record player positioned for reading.

Day 1

Introduce self; then, briefly tell the potential subject that you are going to be having some of the students at his school help you tryout a new type of record player that APH is developing to use with a recorded edition of an encyclopedia. Explain that those students who participate in the tryout will spend one class period (to be scheduled by the school) working with you--today and for the next 3 days during which time they will learn how to use the new record player. Then ask the student if he would be willing to take part in the tryout.

Yes____ No_____

If the student seems reluctant or is not willing to participate, do not pressure. Dismiss him politely.

If the student is willing, check with him to verify that he will be available for the next 3 days and has no insurmountable scheduling problems.

Then say:

> DURING THE NEXT FEW DAYS YOU ARE GOING TO LEARN HOW TO USE A SPECIAL RECORD PLAYER AND THE MATERIALS THAT ACCOMPANY IT TO FIND ITEMS IN A RECORDED ENCYCLOPEDIA. BY THE END OF THIS TIME YOU WILL BE ABLE TO LOCATE SUCH ITEMS WITHOUT HELP FROM ME. DO YOU HAVE ANY QUESTIONS?

Review of Encyclopedia

Definition. An encyclopedia is quite different from a dictionary. The dictionary gives the spelling of a word, its meaning, its pronunciation, and similar information about the word. The encyclopedia takes up the subject for which the word stands. It tells in detail such things as: why it is important in our lives, what it looks like, how it works, and what its history has been. Communication is a word which the dictionary defines in a brief paragraph. But an encyclopedia gives many pages of words to an article on communication. The article describes the various forms of communication such as the telephone, the telegraph, and the radio, and tells how they developed from earlier forms of communication.

An encyclopedia is a reference work that presents a selected collection of facts covering all fields of human knowledge. All the worthwhile things that man has ever known or done from the dawn of civilization to the present day may be found in the pages of an encyclopedia. The basic aims of the modern encyclopedia are:

1. To present the important facts about man, the world he lives in, the things he has done, and the ideas he has developed.
2. To present these facts without bias or personal opinion, in language that is easy to understand.

Day 1

History. Aristotle, who lived from 384-322 B.C., is known as the "Father of Encyclopedists" as he made one of the first attempts to gather all the knowledge of his time into a series of books. In Aristotle's time it was much easier to compile an encyclopedia than it is today because not so much was known about the world. Today, so much is known that only the important facts can be selected for a general encyclopedia. Good encyclopedias of today have to undergo continuous revision and expansion to keep up with the rapidly growing fields of human knowledge.

Format. Encyclopedias are handy reference works in which information on all or many branches of knowledge may be found. This information is given in articles which are alphabetically arranged so that they may be found easily. Cross-references are found with some entries. These tell where more information about the subject may be found.

Uses. If the subject reported he had used an encyclopedia, ask him to tell you the kinds of things for which he has used it. List below:

Continue with a general discussion of the kinds of things for which a student might use an encyclopedia; such as, making reports for history and science, getting information needed for writing papers in English, learning more about things in which he is personally interested, etc.

Day 1

Activities to Familiarize Subjects with the Aural Study System

I. Familiarization to the record player

"The subject should be able to . . ."

A. Recognize the three features that are located on the top deck.

1. Examine the top deck and name the features with which you are already familiar.

2. Discuss the location of the turntable, tone arm, and record guides (which are not utilized with 9-inch records).

3. Discuss the shape of each feature and its position relative to the sides of the top deck.

4. Name the three features named in A-2.

B. Recognize the seven features that are located on the front panel.

1. Discuss the location of the power/volume control, the tone control, the variable speed control, the fast forward/fast reverse control, the pause control, and the keyboard. Note also the location of the headphone jack.

2. Discuss the shape of each control and its position relative to the other controls and reference points of the panel.

3. Name the seven features discussed in B-1.

C. Describe each control in respect to its shape and operation.

1. What is the shape of the power/volume and tone controls?

2. What is the shape of the variable speed control? How does it differ from the other two round controls?

3. What is the shape of the fast forward/fast reverse and pause controls?

D. Recognize and operate all major controls and/or features.

[Experimenter--place record on turntable, side one up]

1. Activate each control especially noting the movements required for the round controls and the toggle type switches.

2. Demonstrate the range of speed (6 1/4 - 16 2/3 rpm) possible using the variable speed control and that normal speed is obtained by merely pushing the knob in regardless of position.

3. Note the power to the machine is activated through the power/volume control (to demonstrate, be sure tone arm is out of its rest or center positions).

4. Discuss the keyboard. Note that the top row contains six keys which are labeled with the letters A through F and that the bottom row contains five keys which are labeled 1 through 5. Practice punching different combinations of letters and numbers.

[Experimenter--disengage all buttons on keyboard.]

5. Practice using the special features of the tone arm

    a. Horizontal movement--use lip to move

    b. So that the stylus does not drag, the lever on the top must be depressed. This retracts the stylus assembly which is necessary for horizontal movement.

    c. Record edge finder--engaged through depressing button on the front of lever.

    d. Automatic shut-off of power when tone arm is in its rest position or positioned as it would be at the end of a record side.

6. Operate any feature or control of the player upon command.

II. Familiarization to an encyclopedia record (use sides one and two).

"The experimenter should . . ."

A. Have the subject examine the record noting it is a flexible disc.

    1. Size--9 inch

    2. Label--containing side number

B. Tell the subject the record is cut stereophonically--two channels within a groove

    1. Regular channel

        a. Containing content information

        b. To be played at 8 1/3 rpm

    2. Index channel

        a. Containing index information--about 75% of the items heard on the regular channel are indexed (also heard on the index channel).

b. To be played at 66 2/3 rpm

C. Tell the subject that when the record is played on the special record player:

1. The two channels are heard separately. Demonstrate.

2. The regular channel is heard, at the appropriate speed, when the player is in the regular play mode including when the variable speed mechanism is engaged. Demonstrate.

3. The index channel is heard, at the appropriate speed, when the player is operated in the fast forward/fast reverse mode. Demonstrate.

D. Have the subject practice placing the record on the turntable.

III. Familiarization to the indexing capabilities of the system.

"The subject should be able to . . ."

A. Move the tone arm to specified keyed positions on the record--note "stop"

1. Find specific keyed position upon command from the experimenter.

2. Understand the organization of the keyed positions.

a. Note that the beginning of the record is found by pushing the C-5 keyed position (A-1 through C-4 positions are used with larger records.)

b. Note the keyed positions fall at set increments that progress across the record as the keyed positions progress from C-5, D-1, D-2 . . . F-5.

B. Use the fast forward/fast reverse capability to find indexed items.

1. Locate the first indexed item following specified keyed positions.

2. Locate the beginning of B-1 items on the regular channel.

3. Use the fast reverse to relocate the beginning of items.

Day 1

IV. Familiarization to the written index.

"The subject should be able to . . ."

A. Find the specified items on the index

1. Note the alphabetical arrangement of the index.

2. Note the index shows the record sides where the indexed items are located.

3. Note the keyed positions are given for some indexed items.

B. Relate the index to the record

1. Understand that the index lists all items heard on the index channel.

a. Demonstrate noting the index shows the sequence as well.

b. Note that not all items are heard on the index channel. Demonstrate

C. Using the index, find specified items on the record.

(see practice items)

Day 2

At the beginning of Day 2, briefly review the components of the Aural Study System with its encyclopedia application.

1. Record player
    - Power/volume control--locate
    - Tone control--locate
    - Fast forward/fast reverse control
        - Locate
        - Operate fast forward
        - Operate fast reverse
    - Variable speed
        - Locate
        - Engage
        - Fastest position
        - Slowest position
        - Disengage
    - Pause control
        - Engage
        - Disengage
    - Keyboard
        - Which row is marked with letters? [top]
        - Which is marked with numbers? [bottom]
        - Punch E-4. Would this position be on a 9-inch record? [yes]
        - Punch B-1. Would this position be on a 9-inch record? [no]

Tone arm

How is the tone arm moved? [horizontally]

What do you have to do before you can move it? [depress the lever on the top]

Why? [to retract the stylus assembly and keep it from dragging across the record]

What part of the tone arm do you use to move it? [the lip of the lever]

What happens when the tone arm is moved all the way to the right and is in its rest position? [power is turned off]

What happens when the tone arm is at the end of a record? [power is turned off]

2. Record

What kind of record is this? [stereophonic, 9-inch, flexible]

What do the labels tell you? [the sides]

What do you hear in the regular channel? [content]

What do you hear in the index channel? [indexed items]

How do you engage the index channel? [ff/fr control]

Show me.

3. Written index

How is the index arranged [alphabetically]

Are all of the items heard on the record listed on the index? [no]

What items are listed on the index? [indexed items]

What things does the written index tell you that will help you locate items on a record? [record side, keyed position of item or of a preceding item, sequence of indexed items]

Day 2

4. Use of the Aural Study System in an integrated way

Find Bear, Great and Little on the written index.

On what side of the record will it be found? [one]

What is its key position? [D-5]

Now, how would you find Bear, Great and Little on the record? Tell me.

Place record on turntable with side one up ready to play

Punch keys D and 5

Move tone arm to "stop"

Release tone arm

Use fast forward until term is heard

Release fast forward control when term is heard completely (as listed on the index)

Find it on the record.

After the item has been located on the record, go over any point on which the subject seems unsure or confused. Then, continue with the practice items listed for Days 1 and 2 starting with the item immediately following the last one attempted on Day 1.

Days 1 and 2

Practice Items Found on Sides One and Two

NOTE TO EXAMINER: All items must be located on the regular channel.

1. Find the item Bede [beed]. (Give cue card.)
   Side 2, E-4

   Use index
   Verbalize search technique
   Keyboard
   Locate

2. Under the item Bee, find Introduction and Interesting Facts. (Give cue card.) Side 2, F-2

   Use index
   Verbalize search technique
   Keyboard
   Locate

3. Under the item Beaver, find Life of a Beaver. (Give cue card.)
   Side 2, C-5

   Use index
   Verbalize search technique
   Keyboard
   Locate

4. Find the article on Beatrice Portinari. (Give cue card.)
   Side 1, E-5, second indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

5. Find the article on Beatitudes. (Give cue card.)
   Side 1, E-4, fourth indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

6. Find Bedloe's Island. (Give cue card.)
braille--Side 2, E-5, fourth indexed item
Large type--Side 2, E-5, third indexed item

    Use index
    Vebalize search technique
    Keyboard
    Locate

7. Not all of the items are indexed. The next one I am going to ask you to find is the second article on Bed. (Give cue card.) It will follow the first article on Bed which is listed on the index. (After the article is found, have the subject listen to enough of it to know what it concerns; then, discuss why there are two separate listings under the same name. [different meanings]
Side 2, E-2, first item after the first indexed item

    Use index
    Verbalize search technique
    Keyboard
    Locate

8. Now find the article on Bears and Bulls. (Give cue card.)
Side 1, E-4, First item after the first indexed item

    Use index
    Verbalize search technique
    Keyboard
    Locate

9. Find Beatification. (Give cue card.)
Side 1, E-4, first item after the third indexed item

    Use index
    Verbalize search technique
    Keyboard
    Locate

NOTE TO EXAMINER: At this point review with the subject the three ways in which items can be located.

indexed and keyed
indexed but not keyed
not indexed

Days 1 and 2

10. Find the article on the Beatles. (Give cue card.)
Side 1, E-5

    Use index
    Verbalize search technique
    Keyboard
    Locate

11. Find the article on Beard, Daniel. (Give cue card.)
braille--Side 1, E-1 fourth indexed item
large type--Side 1, E-1, third indexed item

    Use index
    Verbalize search technique
    Keyboard
    Locate

12. Find the article on Beaverbrook, Lord. (Give cue card.)
braille--Side 2, D-3, second item after the first indexed item
large type--Side 2, D-2, second item after the first indexed item

    Use index
    Verbalize search technique
    Keyboard
    Locate

13. Find Bean Tree. (Give cue card.)
Side 1, C-5

    Use index
    Verbalize search technique
    Keyboard
    Locate

14. Find Bedlington Terrier. (Give cue card.)
braille--Side 2, E-5, third indexed item
large type--side 2, E-5, second indexed item

    Use index
    Verbalize search technique
    Keyboard
    Locate

15. Find Beaux-Arts, École des [ā kôl']. (Give cue card.)
Side 1, F-3, second item after second indexed item

    Use index
    Verbalize search technique
    Keyboard
    Locate

Days 1 and 2

16. Find Beccaria, Cesare [che' zä re]. (Give cue card.)
braille--Side 2, D-3, first item after third indexed item
large type--Side 2, D-3, first item after second indexed item

Use index
Verbalize search technique
Keyboard
Locate

17. Find Bedouin [BED oo in]. (Give cue card.)
braille--Side 2, E-5, first item after fourth indexed item
large type--Side 2, E-5, first item after third indexed item

Use index
Verbalize search technique
Keyboard
Locate

18. Find Beasts of Burden. (Give cue card.)
Side 1, E-4, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

19. Under Bee, find Life of the Honeybee. (Give cue card.)
Side 2, F-5

Use index
Verbalize search technique
Keyboard
Locate

20. Find the article on Bear River. (Give cue card.)
Side 1, D-5, second item after first indexed item (note alphabetization)

Use index
Verbalize search technique
Keyboard
Locate

21. Find Beat. (Give cue card.)
Side 1, E-4, third indexed item

Use index
Verbalize search technique
Keyboard
Locate

Days 1 and 2

22. Find Bechuanaland [bech' o͞o wän' ə land'] Protectorate. (Give cue card.)
braille--Side 2, D-3, third item after third indexed item
large type--Side 2, D-3, third item after second indexed item

Use index
Verbalize search technique
Keyboard
Locate

23. Under Bear, find the section on Kinds of Bears. (Give cue card.)
Side 1, D-2

Use index
Verbalize search technique
Keyboard
Locate

24. Find Beardsley, Aubrey. (Give cue card.)
Side 1, E-2

Use index
Verbalize search technique
Keyboard
Locate

25. Find the article on Beauharnais [bō är ne']. (Give cue card.)
Side 1, F-1, first item after second indexed item (note that full name not given on index)

Use index
Verbalize search technique
Keyboard
Locate

26. Find Beaver College. (Give cue card.)
braille--Side 2, D-3
large type--Side 2, D-2

Use index
Verbalize search technique
Keyboard
Locate

27. Find Bebop. (Give cue card.)
braille--Side 2, D-3, third indexed item
large type--Side 2, D-3, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

28. Find the article on Beauty Care. (Give cue card.)
Side 1, F-3, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

29. Find Becker, Carl. (Give cue card.)
braille--Side 2, D-3, fourth indexed item
large type--Side 2, D-3, third indexed item

Use index
Verbalize search technique
Keyboard
Locate

30. Find Beaumarchais [boh mahr SHEH]. (Give cue card.)
Side 1, F-1, second item after second indexed item (full name not given on index)

Use index
Verbalize search technique
Keyboard
Locate

31. Now find Beauty. (Give cue card.)
Side 1, F-3

Use index
Verbalize search technique
Keyboard
Locate

32. Find Becket, Saint Thomas À. (Give cue card.)
Side 2, D-4

Use index
Verbalize search technique
Keyboard
Locate

33. Find Beaver State. (Give cue card.)
braille--Side 2, D-3, first item after first indexed item
large type--Side 2, D-2, first tiem after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

34. Under Bear, find Life of a Bear. (Give cue card.)
Side 1, D-1, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

35. Now under Bear find Body of a Bear. (Give cue card.)
Side 1, D-1

Use index
Verbalize search technique
Keyboard
Locate

36. Find Beaumont, Francis. (Give cue card.)
Side 1, F-2

Use index
Verbalize search technique
Keyboard
Locate

37. Find Beau Brummell. (Give cue card.)
Side 1, E-5, fourth indexed item

Use index
Verbalize search technique
Keyboard
Locate

38. Now find the article on Bear. (Give cue card.)
Side 1, C-5, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

39. Find Bedfordshire. (Give cue card.)
braille--Side 2, E-5, third item after first indexed item
large type--Side 2, E-4, third item after second indexed item

Use index
Verbalize search technique
Keyboard
Locate

40. Find Beckett, Samuel. (Give cue card.)
Side 2, D-5

Use index
Verbalize search technique
Keyboard
Locate

Day 3

Practice Items Found on Sides Three and Four

Review briefly any point on which the subject seemed unsure. Then tell him that you are going to be finding items on a different record today. Before starting with the practice items, give the subject a chance to look over the written index. Have him note where sides three and four are.

NOTE TO EXAMINER: All items must be located on the regular channel.

1. Under Borden, Sir Robert, find Prime Minister. (Give cue card.)
   Side 3, F-3

   Use index
   Verbalize search technique
   Keyboard
   Locate

2. Find boot. (Give cue card.)
   Side 3, D-4, second item after first indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

3. Find Borglum, Gutzon [BAWR glum, Gut`s'n]. (Give cue card.)
   Side 4, D-3

   Use index
   Verbalize search technique
   Keyboard
   Locate

4. Find Boreas ['bōrēas]. (Give cue card.)
   Side 4, D-1, third indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

5. Find Bordeaux. (Give cue card.)
   Side 3, E-4, second indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

Day 3

6. Find Borrowing; the second one. (Give cue card.)
   Side 4, F-2, first item after first indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

7. Find the second Booth. (Give cue card.)
   Side 3, E-1

   Use index
   Verbalize search technique
   Keyboard
   Locate

8. Now find the first Booth. (Give cue card.)
   Side 3, D-5, second indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

9. Find the article on Borden, Gail. (Give cue card.)
   braille--Side 3, E-5, first item after second indexed item
   large type--Side 3, E-5, first item after first indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

10. Find Borman, Frank. (Give cue card.)
    Side 4, D-5

    Use index
    Verbalize search technique
    Keyboard
    Locate

11. Now find Bosnia and Hercegovina [BAHZ nih uh and HUR tsuh goh VEE nuh]. (Give cue card.)
    Side 4, F-3, second indexed item

    Use index
    Verbalize search technique
    Keyboard
    Locate

Day 3

12. Under Boston, find the section Introduction and Facts in Brief. (Give cue card.)
Side 4, F-5, third indexed item

Use index
Verbalize search technique
Keyboard
Locate

13. Find Bornu [bôr nōō']. (Give cue card.)
Side 4, E-4, second item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

14. Find Boris III. (Give cue card.)
braille--Side 4, D-4, first item after second indexed item
large type--Side 4, D-4, first item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

15. Find bore [bôr]. (Give cue card.)
Side 4, D-1

Use index
Verbalize search technique
Keyboard
Locate

16. Now find borough. (Give cue card.)
Side 4, F-1

Use index
Verbalize search technique
Keyboard
Locate

17. Find Boone, Daniel. (Give cue card.)
Side 3, C-5

Use index
Verbalize search technique
Keyboard
Locate

Day 3

18. Find Bosco, Saint John. (Give cue card.)
Side 4, F-3 first item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

19. Find Borodin, Alexander [bahr oh DEEN]. (Give cue card.)
Side 4, E-4, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

20. Find Boracic Acid [bə ras' ik]. (Give cue card.)
Side 3, E-2, first item after second indexed item

Use index
Verbalize search technique
Keyboard
Locate

21. Now find the article on Borlaug, Norman. (Give cue card.)
braille-- Side 4, D-4 first item after third indexed item
large type--Side 4, D-4, first item after second indexed item

Use index
Verbalize search technique
Keyboard
Locate

22. Find Borromeo Seminary [bahr of MAY oh]. (Give cue card.)
Side 4, F-1, third indexed item

Use index
Verbalize search technique
Keyboard
Locate

23. Find Borges, Jorge Luis [BOR heyss]. (Give cue card.)
Side 4, D-2, first item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

Day 3

24. Now find Bossuet, Jacques [BAW syoo EH]. (Give cue card.)
Side 4, F-5

Use index
Verbalize search technique
Keyboard
Locate

25. Find Border Terrier. (Give cue card.)
Side 4, C-5, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

Day 4

Test Tasks

NOTE TO EXAMINER: The starting setup for each test task is--the record off the turntable, placed on the table to the left of the record player with side five up, oriented for reading; and, the tone arm in its rest position. The written index should be on the table to the right of the player. The pause should be disengaged. Two time scores are to be recorded for each task: (1) time spent using the written index and (2) total time. Each task should be read to the subject, verbatim, and the cue card then handed to the subject. The stopwatch should be started as the cue card is given to the subject. The first time (time spent using written index) should be noted when the subject first touches the player. The second time (total time) should be recorded as the subject engages the pause after having found the test item on the regular channel. No assistance may be given at any point during the test. The maximum time allowed for each task is 4 minutes.

Before administering the test tasks, tell the subject that he will be looking up items on a different record today and that today he will be "on your own." Then suggest he take a moment to look over the written index for today's record. (Allow 1 minute--give no assistance in reading.)

1. Find the aritlce on Buoy. When you have found it, engage the pause.
   (Give cue card.)
   Side 6, E-3

   Time spent using written index______________Total time______________

   Was item found correctly?__________________

   Comments:

2. Find the article on Burglary. Engage the pause when you have found it.
   (Give cue card.)
   Side 6, F-4, second indexed item

   Time spent using written index______________Total time______________

   Was item found correctly?__________________

   Comments:

Day 4

3. Now find the article on Bull Moose Party. When you have found it, engage the pause. (Give cue card.)
Side 5, E-4, first item after third indexed item

Time spent using written index______________Total time______________

Was item found correctly?__________________

Comments:

4. Find Bunsen Burner. Pause after you have found it. (Give cue card.)
Side 6, D-5

Time spent using written index______________Total time______________

Was item found correctly?__________________

Comments:

5. Find the article on Bullet. Pause after you have found it. (Give cue card.)
Side 5, E-5, third indexed item

Time spent using written index______________Total time______________

Was item found correctly?__________________

Comments:

6. Now find the article on Buonarroti, Michelangelo [bwō' när rō'tē]. When you have found it, pause. (Give cue card.)
Side 6, E-2, first item after first indexed item

Time spent using written index______________Total time___________

Was item found correctly?____________________

Comments:

7. Under Bulgaria, find the section on Government. After you have found it, pause. (Give cue card.)
Side 5, D-5

Time spent using written index________________Total time________________

Was item found correctly?

Comments:

8. Now find the article on Burbank. Pause when you have found it. (Give cue card.)
Side 6, E-4, third indexed item

Time spent using written index________________Total time________________

Was item found correctly?____________________

Comments:

9. Now find the article on Bunchberry. When you have found it, pause. (Give cue card.)
Side 6, D-2 first item after first indexed item

Time spent using written index________________Total time________________

Was item found correctly?____________________

Comments:

Day 4

10. Now find Burchfield, Charles. Pause when you have found this article.
(Give cue card.)
Side 6, F-1

Time spent using written index_______________Total time_______________

Was item found correctly?____________________

Comments:

11. Find the article on Bunyan, John. Pause when you have found it.
(Give cue card.)
Side 6, E-1, second indexed item

Time spent using written index_______________Total time_______________

Was item found correctly?____________________

Comments:

12. Find the article on Bureaucracy. When you have found it, pause. (Give cue card.)
Side 6, F-2, first item after second indexed item

Time spent using written index_______________Total time_______________

Was item found correctly?____________________

Comments:

APPENDIX C

FIELD TRAIL 2

SAMPLE OF WRITTEN INDEX

Bean Tree--Bee

Side One	Item No.	Key
Bean Tree...........	1	C-4
Bear--Body...........	2a	C-5
Bear--Life...........	2b	D-1
Bear--Kinds..........	2c	D-2
Bear, Great and Little.............	3	D-5
Beard, Daniel........	9	E-1
Bearing..............	12	E-2
Bearing Circle.......	13	E-3
Beatitudes...........	18	E-4
Beau Brummell........	22	E-5
Beaumont, Francis....	29	F-1
Beauregard...........	31	F-2
Beauty Care..........	33	F-3
Beaver--Body.........	35a	F-4

Side Two	Item No.	Key
Beaver--Life...........	35b	C-4
Beaver College.........	36	D-2
Bebop..................	40	D-3
Beckett, Samuel........	46	D-4
Beckley................	47	D-5
Bed....................	50	E-1
Bedbug.................	52	E-2
Bede...................	53	E-3
Bedford, Duke of.......	54	E-4
Bedloe's Island........	58	E-5
Bee--Introduction......	61a	F-1
Bee--Honeybee Colony...	61b	F-2
Bee--Life..............	61c	F-4

APPENDIX D

FIELD TRIAL 2

SUBJECT DATA RECORD FORM

FIELD TEST OF PRODUCTION PROTOTYPE RECORD PLAYER FOR RECORDED ENCYCLOPEDIA

SUBJECT DATA RECORD (Revised)

Name________________________________Sex__________IQ range 80-120________ (check)

School______________________________Grade________Experimenter____________

Week of_____________________________Schedule______________________________

Reading Medium______________________Number of years using_________________

If braille, any useful vision?____

Has subject ever used an encyclopedia?____________________________________

Daily Record

Day One

Number of practice items attempted:

Keyboard use:

Index use:

Other:

Day Two

Number of practice items attempted:

Keyboard use:

Index use:

Other:

Day Three

Number of practice items attempted:

Keyboard use:

Index use:

Other:

Day Four

Number of test items completed correctly:

Day Four--Continued

Keyboard use:

Index use:

Other:

General Observations

Daily Starting Setup

All equipment and materials required for the day should be placed on a table providing ample space.

Two chairs--one for the subject and one for the experimenter

Good lighting in testing environment where large type subjects are to work

Orientation of directions--the user

- The player should be setup ready for use (cork padding on turntable)
    - Plugged into an electrical outlet
    - Lid off and placed behind or behind and to the side of player
    - Speaker plugged into speaker jack at back of player
    - Tone arm swung all the way to the right in rest position
    - Power/volume control
        - Day 1--in off position (full counterclockwise)
        - Days 2, 3, and 4--power on, volume set at moderate
    - Tone control--set midway between treble and bass
    - Variable speed control--pushed in; therefore, not engaged and located midway between fastest and slowest
    - Keyboard--no keys depressed.
    - Pause control--released
    - Foot control--not present
    - Headphones--not present
- The materials required each day are one record, its index, and the corresponding set of cue cards.
    - Days 1 and 2--the record containing sides one and two
    - Day 3--the record containing sides three and four
    - Day 4--record containing sides five and six
        - The appropriate record should be placed on the table at left side of the record player with the odd side up, oriented so that the odd number is positioned for reading.

Daily Starting Setup (Continued)

The record's written index should be placed on the table at the right of the record player positioned for reading.

Day 1

Introduce self; then, briefly tell the potential subject that you are going to be having some of the students at his school help you tryout a new type of record player that APH is developing to use with a recorded edition of an encyclopedia. Explain that those students who participate in the tryout will spend one class period (to be scheduled by the school) working with you--today and for the next 3 days during which time they will learn how to use the new record player. Then ask the student if he would be willing to take part in the tryout.

Yes_____ No_____

If the student seems reluctant or is not willing to participate, don't pressure. Dismiss him politely.

If the student is willing, check with him to verify that he will be available for the next 3 days and has no insurmountable scheduling problems.

Then say:

> DURING THE NEXT FEW DAYS YOU ARE GOING TO LEARN HOW TO USE A SPECIAL RECORD PLAYER AND THE MATERIALS THAT ACCOMPANY IT TO FIND ITEMS IN A RECORDED ENCYCLOPEDIA. BY THE END OF THIS TIME YOU WILL BE ABLE TO LOCATE SUCH ITEMS WITHOUT HELP FROM ME. DO YOU HAVE ANY QUESTIONS?

Review of Encyclopedia

Definition. An encyclopedia is quite different from a dictionary. The dictionary gives the spelling of a word, its meaning, its pronunciation, and similar information about the word. The encyclopedia takes up the subject for which the word stands. It tells in detail such things as: why it is important in our lives, what it looks like, how it works, and what its history has been. Communication is a word which the dictionary defines in a brief paragraph. But an encyclopedia gives many pages of words to an article on communication. The article describes the various forms of communication such as the telephone, the telegraph, and the radio, and tells how they developed from earlier forms of communication.

An encyclopedia is a reference work that presents a selected collection of facts covering all fields of human knowledge. All the worthwhile things that man has ever known or done from the dawn of civilization to the present day may be found in the pages of an encyclopedia. The basic aims of the modern encyclopedia are:

1. To present the important facts about man, the world he lives in, the things he has done, and the ideas he has developed.

Day 1

2. To present these facts without bias or personal opinion, in language that is easy to understand.

History. Aristotle, who lived from 384-322 B.C., is known as the "Father of Encyclopedists" as he made one of the first attempts to gather all the knowledge of his time into a series of books. In Aristotle's time it was much easier to compile an encyclopedia than it is today because not so much was known about the world. Today, so much is known that only the important facts can be selected for a general encyclopedia. Good encyclopedias of today have to undergo continuous revision and expansion to keep up with the rapidly growing fields of human knowledge.

Format. Encyclopedias are handy reference works in which information on all or many branches of knowledge may be found. This information is given in articles which are alphabetically arranged so that they may be found easily. Cross-references are found with some entries. These tell where more information about the subject may be found.

Uses. If the subject reported he had used an encyclopedia, ask him to tell you the kinds of things for which he has used it. List below:

Continue with a general discussion of the kinds of things for which a student might use an encyclopedia; such as, making reports for history and science, getting information needed for writing papers in English, learning more about things in which he is personally interested, etc.

Day 1

Activities to Familiarize Subjects with the Aural Study System

I. Familiarization to the record player

"The subject should be able to . . ."

A. Recognize the three features that are located on the top deck.

1. Examine the top deck and name the features with which you are already familiar.

2. Discuss the location of the turntable, tone arm, and record guides (which are not utilized with 9-inch records).

3. Discuss the shape of each feature and its position relative to the sides of the top deck.

4. Name the three features named in A-2.

B. Recognize the seven features that are located on the front panel.

1. Discuss the location of the power/volume control, the tone control, the variable speed control, the fast forward/fast reverse control, the pause control, and the keyboard. Note also the location of the headphone jack.

2. Discuss the shape of each control and its position relative to the other controls and reference points of the panel.

3. Name the seven features discussed in B-1.

C. Describe each control in respect to its shape and operation.

1. What is the shape of the power/volume and tone controls?

2. What is the shape of the variable speed control? How does it differ from the other two round controls?

3. What is the shape of the fast forward/fast reverse and pause controls?

D. Recognize and operate all major controls and/or features

[Experimenter--place record on turntable, side one up.]

1. Activate each control especially noting the movements required for the round controls and the toggle type switches.

2. Demonstrate the range of speed (6 1/4 - 16 2/3 rpm) possible using the variable speed control and that normal speed is obtained by merely pushing the knob in regardless of position.

3. Note the power to the machine is activated through the power/volume control (to demonstrate, be sure tone arm is out of its rest or center positions).

4. Discuss the keyboard. Note that the top row contains six keys which are labeled with the letters A through F and that the bottom row contains five keys which are labeled 1 through 5. Practice punching different combinations of letters and numbers.

[Experimenter--disengage all buttons on keyboard.]

5. Practice using the special features of the tone arm

    a. Horizontal movement--use lip to move

    b. So that the stylus does not drag, the lever on the top must be depressed. This retracts the stylus assembly which is necessary for horizontal movement.

    c. Record edge finder--engaged through depressing button on the front of lever

    d. Automatic shut-off of power when tone arm is in its rest position or positioned as it would be at the end of a record side.

6. Operate any feature or control of the player upon command.

II. Familiarization to an encyclopedia record (use sides one and two).

"The experimenter should . . ."

A. Have the subject examine the record noting it is a flexible disc.

1. Size--9 inch

2. Label--containing side number

B. Tell the subject the record is cut stereophonically--two channels within a groove.

1. Regular channel

    a. Containing content information

    b. To be played at 8 1/3 rpm

2. Index channel

   a. Containing index information--about 75% of the items heard on the regular channel are indexed (also heard on the index channel).

   b. To be played at 66 2/3 rpm.

   c. All items numbered, most also named.

C. Tell the subject that when the record is played on the special record player:

   1. The two channels are heard separately. Demonstrate.

   2. The regular channel is heard, at the appropriate speed, when the player is in the regular play mode including when the variable speed mechanism is engaged. Demonstrate.

   3. The index channel is heard, at the appropriate speed, when the player is operated in the fast forward/fast reverse mode. Demonstrate.

D. Have the subject practice placing the record on the turntable.

III. Familiarization to the indexing capabilities of the system.

"The subject should be able to . . ."

A. Move the tone arm to specified keyed positions on the record--note "stop"

   1. Find specific keyed position upon command from the experimenter.

   2. Understand the organization of the keyed positions.

      a. Note that the beginning of the record is found by pushing the C-4 keyed position (A-1 through C-3 positions are used with larger records).

      b. Note the keyed positions fall at set increments that progress across the record as the keyed positions progress from C-4, C-5, D-1, D-2, . . . F-5.

B. Use the fast forward/fast reverse capability to find indexed items

   1. Locate the first indexed item following specified keyed positions.

   2. Locate the beginning of B-1 items on the regular channel.

   3. Use the fast reverse to relocate the beginning of items.

IV. Familiarization to the written index.

"The subject should be able to . . ."

A. Find specified items on the index.

1. Note the alphabetical arrangement of the index.
2. Note the index shows the record sides where the indexed items are located.
3. Note the items are numbered.
4. Note the keyed positions are given for all listed indexed items.

B. Relate the index to the record.

1. Understand that the index lists only a few of the items heard on the index channel.
    a. Demonstrate noting the index lists the first named item occurring for each keyed position.
    b. Note that not all items are heard on the index channel. Demonstrate.

C. Using the index, find specified items on the record.

(see practice items)

Day 2

At the beginning of Day 2, briefly review the components of the Aural Study System with its encyclopedia application.

1. Record player
    - Power/volume control--locate
    - Tone control--locate
    - Fast forward/fast reverse control
        - Locate
        - Operate fast forward
        - Operate fast reverse
    - Variable speed
        - Locate
        - Engage
        - Fastest position
        - Slowest position
        - Disengage
    - Pause control
        - Engage
        - Disengage
    - Keyboard
        - Which row is marked with letters? [top]
        - Which is marked with numbers? [bottom]
        - Punch E-4. Would this position be on a 9-inch record? [yes]
        - Punch B-1. Would this position be on a 9-inch record? [no]

Day 2

Tone arm

How is the tone arm moved? [horizontally]

What do you have to do before you can move it? [depress the lever on the top]

Why? [to retract the stylus assembly and keep it from dragging across the record]

What part of the tone arm do you use to move it? [the lip of the lever]

What happens when the tone arm is moved all the way to the right and is in its rest position? [power is turned off]

What happens when the tone arm is at the end of a record? [power is turned off]

2. Record

What kind of record is this? [stereophonic, 9-inch, flexible]

What do the labels tell you? [the sides]

What do you hear in the regular channel? [content]

What do you hear in the index channel? [indexed items]

How do you engage the index channel? [ff/fr control]

Show me.

3. Written index

How is the index arranged [alphabetically]

Are all of the items heard on the record listed on the index? [no]

What items are listed on the index? [first named item heard for each keyed position]

What things does the written index tell you that will help you locate items on a record? [record side, keyed position, and numbers of some items]

Day 2

4. Use of the Aural Study System in an integrated way

Find Bear, Great and Little on the written index.

On what side of the record will it be found? [one]

What is its number? [3]

What is its key position? [D-5]

Now, how would you find Bear, Great and Little on the record? Tell me.

Place record on turntable with side one up ready to play

Punch keys D and 5

Move tone arm to "stop"

Release tone arm

Use fast forward until term is heard

Release fast forward control when number and term are heard.

Find it on the record.

After the item has been located on the record, go over any point which the subject seems unsure or confused. Then, continue with the practice items listed for Days 1 and 2 starting with the item immediately following the last one attempted on Day 1.

Days 1 and 2

Practice Items Found on Sides One and Two

NOTE TO EXAMINER: All items must be located on the regular channel.

1. Find the item Bede [beed]. (Give cue card.)
   Side 2, E-3

   Use index
   Verbalize search technique
   Keyboard
   Locate

2. Under the item Bee, find Introduction and Interesting Facts. (Give cue card.)
   Side 2, F-1

   Use index
   Verbalize search technique
   Keyboard
   Locate

3. Under the item Beaver, find Life of a Beaver. (Give cue card.)
   Side 2, C-4

   Use index
   Verbalize search technique
   Keyboard
   Locate

4. Find the article on Beatrice Portinari. (Give cue card.)
   Side 1, E-4, third indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

5. Find the article on Beardsley, Aubrey. (Give cue card.)
   Side 1, E-1, second indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

6. Find Becket, Saint Thomas À. (Give cue card.)
   Side 2, D-3, third indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

7. Not all of the items are indexed. The next one I am going to ask you to find is the second article on Bed. (Give cue card.) It will follow the first article on Bed which is indexed. (After the article is found, have the subject listen to enough of it to know what it concerns; then, discuss why there are two separate listings under the same name. [different meanings]
   Side 2, E-1, first item after the first indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

8. Now find the article on Bears and Bulls. (Give cue card.)
   Side 1, E-3, first item after the first indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

9. Find Beatification. (Give cue card.)
   Side 1, E-3, first item after the third indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

NOTE TO EXAMINER: At this point review with the subject the three ways in which items can be located.

indexed and keyed
indexed but not keyed
not indexed

Days 1 and 2

10. Find the article on Beard, Daniel. (Give cue card.)
Side 1, E-1

Use index
Verbalize search technique
Keyboard
Locate

11. Find the article on the Beatles. (Give cue card.)
Side 1, E-4, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

12. Find the article on Beaverbrook, Lord. (Give cue card.)
Side 2, D-2, second item after the first indexed item

Use index
Verbalize search technique
Keyboard
Locate

13. Find Bean Tree. (Give cue card.)
Side 1, C-4

Use index
Verbalize search technique
Keyboard
Locate

14. Find Bedlington Terrier. (Give cue card.)
Side 2, E-4, third indexed item

Use index
Verbalize search technique
Keyboard
Locate

15. Find Beaux-Arts, École des [ā kol']. (Give cue card.)
Side 1, F-3, first item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

Days 1 and 2

16. Find Beccaria, Cesare [che' zä re]. (Give cue card.)
Side 2, D-3, first item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

17. Find Bedouin [BED oo in]. (Give cue card.)
Side 2, E-5, first item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

18. Find Beasts of Burden. (Give cue card.)
Side 1, E-3, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

19. Under Bee, find Life of the Honeybee. (Give cue card.)
Side 2, F-4

Use index
Verbalize search technique
Keyboard
Locate

20. Find the article on Bear River. (Give cue card.)
Side 1, D-5, second item after first indexed item (note alphabetization)

Use index
Verbalize search technique
Keyboard
Locate

21. Find Beat. (Give cue card.)
Side 1, E-3, third indexed item

Use index
Verbalize search technique
Keyboard
Locate

Days 1 and 2

22. Find Bechuanaland [bech' o͞o wän' ə land'] Protectorate. (Give cue card.)
Side 2, D-3, third item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

23. Under Bear, find the section on Kinds of Bears. (Give cue card.)
Side 1, D-2

Use index
Verbalize search technique
Keyboard
Locate

24. Find Beatitudes. (Give cue card.)
Side 1, E-4.

Use index
Verbalize search technique
Keyboard
Locate

25. Find the article on Beauharnais [bō är ne']. (Give cue card.)
Side 1, E-5, first item after third indexed item (note that full name not given on index)

Use index
Verbalize search technique
Keyboard
Locate

26. Find Beaver College. (Give cue card.)
Side 2, D-2

Use index
Verbalize search technique
Keyboard
Locate

27. Find Beauty. (Give cue card.)
Side 1, F-2, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

28. Find the article on Bear. (Give cue card.)
Side 1, C-4 second indexed item

Use index
Verbalize search technique
Keyboard
Locate

29. Find Becker, Carl. (Give cue card.)
Side 2, D-3, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

30. Find Beaumarchais [boh mahr SHEH]. (Give cue card.)
Side 1, E-5, second item after third indexed item (full name not given on index)

Use index
Verbalize search technique
Keyboard
Locate

31. Now find Bedloe's Island. (Give cue card.)
Side 2, E-5

Use index
Verbalize search technique
Keyboard
Locate

32. Find Bebop (Give cue card.)
Side 2, D-3

Use index
Verbalize search technique
Keyboard
Locate

33. Find Beaver State. (Give cue card.)
Side 2, D-2, first item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

Days 1 and 2

34. Find Beaufort [BEW furt]. (Give cue card.)
Side 1, E-5, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

35. Now under Bear find Body of a Bear. (Give cue card.)
Side 1, C-5

Use index
Verbalize search technique
Keyboard
Locate

36. Find Beaumont, Francis. (Give cue card.)
Side 1, F-1

Use index
Verbalize search technique
Keyboard
Locate

37. Find Bedlam. (Give cue card.)
Side 2, E-4, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

38. Now find the article on Beaver.(Give cue card.)
Side 1, F-3, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

39. Find Bedford, Gunning, Jr. (Give cue card.)
Side 2, E-4, first item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

40. Find Beckett, Samuel. (Give cue card.)
Side 2, D-4

Use index
Verbalize search technique
Keyboard
Locate

Day 3

Practice Items Found on Sides Three and Four

Review briefly any point on which the subject seemed unsure. Then, tell him that you are going to be finding items on a different record today. Before starting with the practice items, give the subject a chance to look over the written index. Have him note where sides three and four are.

NOTE TO EXAMINER: All items must be located on the regular channel.

1. Under Borden, Sir Robert, find Prime Minister. (Give cue card.)
   Side 3, F-2

   Use index
   Verbalize search technique
   Keyboard
   Locate

2. Find boot. (Give cue card.)
   Side 3, D-4, second item after first indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

3. Find Borglum, Gutzon [BAWR glum, Gut`s' n]. (Give cue card.)
   Side 4, D-2

   Use index
   Verbalize search technique
   Keyboard
   Locate

4. Find Boreas ['bōrēas]. (Give cue card.)
   Side 4, C-5, fourth indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

5. Find Bordeaux. (Give cue card.)
   Side 3, E-3, second indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

Day 3

6. Find Borrowing; the second one. (Give cue card.)
   Side 4, F-1, first item after third indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

7. Find the second Booth. (Give cue card.)
   Side 3, D-5

   Use index
   Verbalize search technique
   Keyboard
   Locate

8. Now find the first Booth. (Give cue card.)
   Side 3, D-4, third indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

9. Find the article on Borges, Jorge Luis [BOR heyss].
   Side 4, D-1, first item after first indexed item

   Use index
   Verbalize search technique
   Keyboard
   Locate

10. Find Border Terrier. (Give cue card.)
    Side 4, C-5

    Use index
    Verbalize search technique
    Keyboard
    Locate

11. Now find Bosnia and Hercegovina [BAHZ nih uh and HUR tsuh goh VEE nuh].
    (Give cue card.)
    Side 4, F-2, third indexed item

    Use index
    Verbalize search technique
    Keyboard
    Locate

Day 3

12. Under Boston, find the section Introduction and Facts in Brief. (Give cue card.)
Side 4, F-5, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

13. Find Borah, William. (Give cue card.)
Side 3, E-1, second item after second indexed item

Use index
Verbalize search technique
Keyboard
Locate

14. Find Boris III. (Give cue card.)
Side 4, D-3, first item after second indexed item

Use index
Verbalize search technique
Keyboard
Locate

15. Find borer. (Give cue card.)
Side 4, D-1

Use index
Verbalize search technique
Keyboard
Locate

16. Now find borough. (Give cue card.)
Side 4, E-5

Use index
Verbalize search technique
Keyboard
Locate

17. Find Boone, Daniel. (Give cue card.)
Side 3, C-4

Use index
Verbalize search technique
Keyboard
Locate

Day 3

18. Find Bosco, Saint John. (Give cue card.)
Side 4, F-2, first item after second indexed item

Use index
Verbalize search technique
Keyboard
Locate

19. Find Borodin, Alexander [bahr oh DEEN]. (Give cue card.)
Side 4, E-4, second indexed item

Use index
Verbalize search technique
Keyboard
Locate

20. Find Boracic Acid [bə ras' ik]. (Give cue card.)
Side 3, E-1, first item after second indexed item

Use index
Verbalize search technique
Keyboard
Locate

21. Now find the article on Borlaug, Norman. (Give cue card.)
Side 4, D-4, first item after first indexed item

Use index
Verbalize search technique
Keyboard
Locate

22. Find Borromeo Seminary [bahr of MAY oh]. (Give cue card.)
Side 4, F-1 second indexed item

Use index
Verbalize search technique
Keyboard
Locate

23. Find Borden, Gail. (Give cue card.)
Side 3, E-4, first item after second indexed item

Use index
Verbalize search technique
Keyboard
Locate

Day 3

24. Now find Bossuet, Jacques [BAW syoo EH]. (Give cue card.)
Side 4, F-4

    Use index
    Verbalize search technique
    Keyboard
    Locate

25. Find Borman, Frank. (Give cue card.)
Side 4, D-4, second indexed item

    Use index
    Verbalize search technique
    Keyboard
    Locate

Day 4

Test Tasks

NOTE TO EXAMINER: The starting setup for each test task is--the record off the turntable, placed on the table to the left of the record player with side five up, oriented for reading; and, the tone arm in its rest position. The written index should be on the table to the right of the player. The pause should be disengaged. Two time scores are to be recorded for each task: (1) time spent using the written index and (2) total time. Each task should be read to the subject, verbatim, and the cue card then handed to the subject. The stopwatch should be started as the cue card is given to the subject. The first time (time spent using written index) should be noted when the subject first touches the player or record. The second time (total time) should be recorded as the subject engages the pause after having found the test item on the regular channel. No assistance may be given at any point during the test. The maximum time allowed for each task is 4 minutes.

Before administering the test tasks, tell the subject that he will be looking up items on a different record today and that today he will be "on your own." Then suggest he take a moment to look over the written index for today's record. (Allow 1 minute--give no assistance in reading.)

1. Find the article on Buoy. When you have found it, engage the pause. (Give cue card.)
   Side 6, E-2, No. 45

   Time spent using written index______________Total time_______________

   Was item found correctly?___________________

   Comments:

2. Find the article on Burglary. Engage the pause when you found it. (Give cue card.)
   Side 6, F-3, second indexed item, No. 65

   Time spent using written index______________Total time_______________

   Was item found correctly?___________________

   Comments:

Day 4

3. Now find the article on Bulldog. When you have found it, engage the pause. (Give cue card.)
Side 5, E-4, second item after second indexed item, No. 16

Time spent using written index______________Total time_______________

Was item found correctly?___________________

Comments:

4. Find Bunsen Burner. Pause after you have found it. (Give cue card.)
Side 6, D-4, No. 39

Time spent using written index______________Total time_______________

Was item found correctly?___________________

Comments:

5. Under Bulgaria, find the section on Government. After you have found it, pause. (Give cue card.)
Side 5, D-3, second indexed item, No. 4d

Time spent using written index______________Total time_______________

Was item found correctly?___________________

Comments:

6. Now find the article on Burke, Arleigh. Pause when you have found it. (Give cue card.)
Side 6, F-5, first item after first indexed item, No. 72

Time spent using written index______________Total time_______________

Was item found correctly?___________________

Comments:

Day 4

7. Find the article on Bullet. Pause after you have found it. (Give cue card.)
Side 5, E-5, No. 18

Time spent using written index______________ Total time______________

Was item found correctly?__________________

Comments:

8. Now find the article on Burbank. Pause when you have found it. (Give cue card.)
Side 6, E-3, third indexed item, No. 50

Time spent using written index______________ Total time______________

Was item found correctly?__________________

Comments:

9. Now find the article on Bunchberry. When you have found it, pause. (Give cue card.)
Side 6, D-1, first item after first indexed item, No. 30

Time spent using written index______________ Total time______________

Was item found correctly?__________________

Comments:

10. Now find Burchfield, Charles. Pause when you have found this article. (Give cue card.)
Side 6, E-5, No. 52

Time spent using written index______________ Total time______________

Was item found correctly?__________________

Comments:

Day 4

11. Find the article on Bunyan, John. Pause when you have found it.
(Give cue card.)
Side 6, D-5, second indexed item, No. 42

Time spent using written index______________Total___________________

Was item found correctly?___________________

Comments:

12. Find the article on Burghley, Lord. When you have found it, pause.
(Give cue card.)
Side 6, F-2, first item after third indexed item, No. 63

Time spent using written index______________Total___________________

Was item found correctly?___________________

Comments:

STUDY III

DESIGN OF WRITTEN INDEXES FOR USE WITH A RECORDED ENCYCLOPEDIA

June E. Morris

Abstract

The format and content of written indexes to accompany recorded reference materials should provide for maximum efficiency of use. In an attempt to determine specifications for such, six different written indexes for a recorded encyclopedia sample were designed and tested with 48 legally blind students from grades 7-12. The indexes varied through two styles and three lengths, or amounts of information (100%, 75%, and 50% of encyclopedia entries listed). Results indicated no overall difference in usage between the two styles and that the indexes containing 100% and 75% of the entries could be used with similar speed and accuracy. Both of these could be used significantly faster and more accurately than the indexes containing only 50% of the entries.

STUDY III

DESIGN OF WRITTEN INDEXES FOR USE WITH A RECORDED ENCYCLOPEDIA

An aural study system has been under development at the American Printing House for the Blind which enables users to rapidly and accurately locate specific places in recorded material. Although the system has evolved from a disc system to a cassette system, basically it is made up of three essential components. These are an indexing playback device, specially treated recorded materials, and a written index. This latter provides index cues for the material contained on the recording. Thus, a user wanting to find a specific page in a text or entry in a reference book would first locate the desired topic or word in the index; note its index cue; place the appropriate disc or cassette on the player; and, using the index cue, locate the desired place. Descriptions of the development of this system are given by Morris, Nolan, and Brothers (1973) and in Studies I and II. The aural study system was originally developed as a possible source for text material; however, its appropriateness for a reference application was immediately apparent and it is along these lines that subsequent development efforts have been directed.

The question of the design of the written indexes has permeated all previous studies of use of recorded reference materials. The problem is that of index reading time vs. recording search time. As shown in Study II, the more information provided in the written index, the greater the time required to find a specific item on it; however, because it provides more specific location information, the less the time required to find the item on the recording and vice versa. Blind students, whether they use braille or large type, have three common problems that interfer with their use of index type written material. One is that it is often difficult for them to scan a page, another is that most read slowly, and the other is that many cannot readily locate words in alphabetical listings. The latter probably reflects lack of an opportunity to practice due to the fact that telephone books, membership directories, etc. are normally not provided in a medium that visually handicapped persons can use. Consequently, if recorded materials are to be used efficiently as a reference source, it is essential that design of the accompanying written indexes provide for maximum speed and accuracy of use. The purpose of this study was to design such. Using information from the previous studies, six different written indexes were designed and compared in terms of time and accuracy of use.

Method

Subjects

Subjects included 48 legally blind students enrolled in academic programs at residential schools for the blind (46 from The Governor

Morehead School in Raleigh, North Carolina, and 2 from the Kentucky School for the Blind in Louisville). Half the subjects used braille and half large type. Of each reading type, 2 male and 2 female subjects were drawn from each of grades 7-12. Only those students who demonstrated they could alphabetize words were included as subjects. This was determined through use of an alphabetical screening test.

Materials

Like materials were provided in braille and large type for subject use. These included an alphabetical screening test (see Appendix A), practice materials, cue cards, and written indexes in six formats (see Appendix B). The indexes all reflected the same 4-hour recording from The World Book Encyclpedia (Field Enterprises, 1973a) which is the amount that can be contained on a 4-track, C-60 audio cassette recorded at 15/16 inches per second. The six indexes varied through two styles and three amounts of information. The two styles differed in placement of index cues which were numbers. In Style I the index cues were placed in a column to the right of the entry words listed. In Style II the index cues followed the entry words immediately. The three amounts of information countained were: Type A with 100% of the entry items listed, Type B with approximately 75% of the entry items listed, and Type C with approximately 50% of the entry items listed.

The indexes not only listed entry words and their related index cues, but also guide words for the cassette track and cue letters for an overall average of 25% of the entry words. Enough of the initial letters of the entry words were retained in the "cues" to be useful in locating the alphabetical positions of sought words. These cues were placed wherever alphabetically significant letter changes occurred and appeared in a column to the left of the entry words.

Rules used in designing Types B and C of the written indexes were that the following types of entries were alwyas retained: (a) the first entry on a track, (b) at least every other entry word, (c) the first word of a letter change important in alphabetizing (i.e., a word for which the cue letters would be given), (d) the first entry where two or more were the same, (e) the first entry after a long article, and (f) all major sections of long articles. Additionally, the last entry on a track whould be retained.

A single column format was used for the braille indexes, which were printed in standard grade 2 braille, and a double column format for those in large type. Entries were often shortened (e.g., to contain just the last and first name of a person where it did not cause ambiguity) in the written indexes in order to save space.

The written indexes used for practice represented 6-hours of recording from another section of The World Book Encyclopedia (Field Enterprises, 1973b). They were those used in a previous study and are described under Field Trial 2 of Study II. Although the "Key" information included on these indexes (e.g., E-2) was not pertinent to the current study and therefore not used, these indexes gave subjects an opportunity to practice locating words alphabetically and relating sides and item numbers to entry words.

Cue cards were used with all practice and test items to insure that there be no question regarding the spelling of sought items. Standard grade 2 braille was used for the braille cards.

Subject data record forms were designed (see Appendix C) to keep a full record of each subject's performance during practice and test sessions. These not only enumerated the tasks, but also outlined the procedure for the examiner.

Practice items included 27 items selected to (a) represent both indexed and nonindexed items, (b) come from throughout the practice index lists being used, and (c) give practice with previously identified usage problems such as with subheadings of major articles and with the word by word alphabetizing method used by The World Book Encyclopedia.

The test contained 24 items selected to be evenly distributed throughout the content. They were chosen so that 25% of the items were not indexed on the Type B indexes and so that 50% were not indexed on the Type C indexes. In each third of the test (first 8 items, second 8 items, third 8 items) all 8 items were listed on the Type A indexes, 6 items on the Type B indexes, and 4 items on the Type C indexes.

Procedure

Initially, two potential subjects were selected by a stratified random menas from those available of each sex, at each of the six grade levels, of each reading type. Alternates were identified, in order of use, at the same time. Each member of the pair were then alternately assigned to use either Style I or Style II indexes as determined by the toss of a coin. Next, potential subjects were screened through use of the alphabetical screening test to assure that all who participated in the study had a working knowledge of how words are alphabetized. In order to qualify for inclusion as a subject, a student had to score a minimum of 80% correct on the screening test. Alternates were used to replace those who did not.

Each subject worked individually with an examiner for two sessions of approximately 45-minutes each. During the first, the screening test was administered and the practice materials were used to familiarize the subjects with index use. During the second, subjects were tested. The test tasks for each subject were to use the three types of written indexes (A, B, C) to locate the index information necessary for subsequent location of specified items in a recording. This information consisted of sides and item numbers. All indexes used by any one subject were of the same style, either Style I or Style II. Each subject was required to locate index information for all 24 test items, 8 using each of the three types of indexes. The proportion of nonindexed words to be located on each reflected the proportion of nonindexed words on that type of index as described. A maximum time limit of 2 minutes was imposed for each task so that each subject would have an opportunity to attempt each test task.

There are six permutations of the order in which the A, B, and C index types can be presented. These are ABC, ACB, BAC, BCA, CAB, and CBA. In each condition of the study one subject was randomly assigned to each of the presentation orders. The index type used for each third of the test was consequently determined (e.g., if permutation order CBA was randomly assigned to subject X; then subject X would use index Type C for items 1-8 on the test, index Type B for items 9-16, and index Type A for items 17-24). The order of the test items remained the same regardless of the permutation used. This procedure allowed for any practice effects to be counterbalanced, or distributed evenly, between the index types.

Prior to the collection of any data a small pilot test was conducted to check the procedures and to give the examiners practice.

Results

The research design was a mixed type involving four factors and using repeated measures. Data were cast in a 2 x 2 x 2 x 3 design. Between subjects variables were grade level (7, 8, 9 vs. 10, 11, 12), reading type (braille vs. large type), and style of written index used (Style I vs. Style II). Amount of information contained on the index (Type A with 100%, vs. Type B with 75% vs. Type C with 50%) was the within subject variable. The design called for 48 subjects; 6 to be assigned to each condition.

The data for accuracy and time were analyzed separately; each being done through use of an analysis of variance for mixed design (split-plot), equal n. Data used in the analysis of accuracy were the percentages correct for each subject for each type (A, B, C) of written index. Data used in the analysis of time were the average times required by each subject for each type (A, B, C) of written index.

Two statistically significant findings resulted from the analysis of the accuracy data. In one, it was found that length of the written indexes was related to accuracy of use ($F = 17.30$; $df = 2, 80$; $p > .01$) with performance using Types A and B being similar and superior to performance using Type C. Table 1 presents these means and standard deviations.

Table 1

Means and Standard Deviations for Three Types of

Indexes in Terms of Percentage Correct

	A	B	C
M	.91	.90	.74
SD	.14	.12	.19

The other significant finding was an interaction between grade level and index style ($F = 5.47$; df = 1, 40; $p > .05$) with subjects from grades 7-9 performing most accurately when using the Style I indexes and those from grades 10-12 performing most accurately when using the Style II indexes. These means and standard deviations are presented in Table 2.

Table 2

Means and Standard Deviations for the Grade Level and Index Style Interaction in Terms of Percentage Correct

	7-9		10-12	
	I	II	I	II
M	.87	.80	.83	.90
SD	.14	.19	.19	.14

Three statistically significant findings resulted from the analysis of the time data. Two were for the main effects length and grade, and the third was an interaction between grade level and index style. As with the accuracy data, length of the written indexes was found to be a significant factor ($F = 13.70$; df = 2, 80; $p > .01$) with the time required to use lengths A and B being similar and less than that required to use length C. Table 3 reports these means and standard deviations.

Table 3

Means and Standard Deviations for Three Types of Indexes in Terms of Seconds

	A	B	C
M	42.56	41.86	56.33
SD	21.01	18.21	21.78

The significant grade level difference found ($F = 7.65$; df = 1, 40; $p > .05$) was in the expected direction with subjects from grades 10-12 working more rapidly than those from grades 7-9. These means and standard deviations are shown in Table 4.

Table 4

Means and Standard Deviations for the Two Grade Levels in Terms of Seconds

	7-9	10-12
M	53.00	40.83
SD	20.20	20.79

The significant interaction found between grade level and index style ($F = 6.31$; $df = 1, 40$; $p > .05$) reflected similar findings to those found for accuracy. As with those, subjects from grades 7-9 worked best, most rapidly, when using the Style I indexes, while those from grades 10-12 worked best when using the Style II indexes. The means and standard deviations for this interaction are presented in Table 5.

Table 5

Means and Standard Deviations for the Grade Level and Index Style Interaction in Terms of Seconds

	7-9		10-12	
	I	II	I	II
M	46.74	59.26	45.62	36.04
SD	18.03	20.55	24.31	15.46

Because of the apparent similarity in both accuracy of use and time required for use of indexes of the A and B lengths, Tukey's tests (T-method) were made to test their means. These post hoc tests revealed no significant differences in either accuracy of use or time required for use between the A and B lengths. However, similar tests comparing the means of lengths B and C and of lengths A and C proved that these differences were significant for both accuracy and time. Results of these tests are shown in Table 6.

Table 6

Results of Tukey's Tests Comparing Means of Lengths (Types) for Different Pairs of Indexes

	T-method	*df*	*p*
Accuracy			
A and B	.410	2, 80	< .05
B and C	3.943	2, 80	> .01
A and C	4.352	2, 80	> .01
Time			
A and B	.183	2, 80	< .05
B and C	3.789	2, 80	> .01
A and C	3.606	2, 80	> .05

Tabulation of the raw data revealed that a total of 34 errors were made on the Type A indexes of which 85% resulted from exceeding the time limits. On the Type B indexes, 40 errors were made of which 18% were caused by subjects not finding the sought item within the time limits. Performance on the Type C indexes was much poorer with there being a total of 98 errors made. Of these, 11% were caused by the calling of time.

A disportionate number of errors made on the Types B and C indexes were on nonindexed items. With Type B, which omitted 25% of the items, 38% of the errors made were for nonindexed items. With Type C, 71% of the errors made were on the 50% of nonindexed items. Test questions reflected the proportion of nonindexed items on the Types B and C of indexes.

In summary, subjects responded correctly to 91% of the test tasks using the Type A indexes, 90% using the Type B indexes, and 74% using the Type C indexes.

Subjective observations made by the examiners included comments regarding alphabetical problems experienced by the subjects such as noting that some had trouble with the word by word alphabetizing method used (though this is probably the most common method in use) and that some subjects did not understand how double letters were alphabetized (e.g., thought that hagfish would come after haggai). Other observations made by the examiners related to how the written indexes could be improved (e.g., that braille indexes extending to more than one page need guide words and the appropriate track information at the top of each page).

Discussion

The purpose of this study was to design a written index for use with recorded materials that would provide for efficient use. Two styles of indexes were designed and tested, each in three lengths. Contradictory findings resulted from the evaluation of the two styles. Subjects from grades 7-9 worked more accurately and more rapidly when using the Style I indexes, while subjects from grades 10-12 worked more accurately and more rapidly when using the Style II indexes. Examiner observations indicated that the Style I indexes seemed to provide for more efficient use because, having index numbers listed in a column, the presence of nonindexed items was more apparent and interpolation of index numbers for such more convenient. Consequently, it was decided to use this style indexes in subsequent research.

No differences in use were found between the Types A and B lengths. Use of both was significantly superior to use of the more abbreviated Type C. Therefore, it was decided to use Type B indexes in subsequent research as these would be less costly to make and less cumbersome to use than the longer Type A.

In all probability, with additional practice, use of written indexes would improve. Examiner comments included the fact that subjects needed more practice. However, even if performance did not improve, 90% accuracy is above that frequently reported for student use materials.

References

Field Enterprises Educational Corporation. The world book encyclopedia (Vol. 9). Chicago: Author, 1973. (a)

Field Enterprises Educational Corporation. The world book encyclopedia (Vol. 2). Chicago: Author, 1973. (b)

Morris, J. E., Nolan, C. Y., & Brothers, R. J. Aural study systems for the visually handicapped: Field trial of the Aural Study System: Interim progress report no. 10 [Project No. 8-0046; Grant No. OEG-0-8-080046-2670(032)]. Louisville, Ky.: American Printing House for the Blind, 1973. (ERIC Document Reproduction Service No. ED 078 620)

APPENDIXES

APPENDIX A

ALPHABETICAL SCREENING TASK

Thorndike-Barnhart Junior Dictionary

Alphabetical Screening Task--Braille Copy

American Printing House for the Blind

Reference Study

There are ten words listed below each of which has three pairs of accompanying words. (Each word is spelled out fully in grade one braille.)* For each numbered word, you are to choose from the three accompanying pairs the one set of words between which the word would come alphabetically. Mark the pair of words by drawing a line through them. For example, does the word "blush" come between bother-brother, bike-billion, or bird-Boston? It comes between bird-Boston so you should have drawn a line through that set of words.

1. bean

   bay - Bible

   birthday - black

   bill - bind

2. blame

   bottom - bowl

   bishop - boat

   beside - bird

3. bound

   bowl - box

   bottom - bow

   bovine - boy

4. bedbug

   become - beehive

   bead - because

   bee - bequeath

* Not included in large type edition.

5. brand

brave - brazen

bracelet - brain

brake - brass

6. baron

barn - barytone

bark - barley

barrel - barter

7. backing

background - backlog

backslide - backwoods

backfire - backhand

8. blues

blueberry - blue laws

bluegrass - bluejay

blueprint - bluet

9. blackjack

blackmail - blacksmith

blackboard - blacklist

blackball - blacking

10. birthmark

birthrate - birthright

birthplace - birthrate

birthday - birthplace

APPENDIX B

SAMPLES OF SIX WRITTEN INDEXES

STYLE I TYPE A

Haber--Hair Track 1

Hab....	Haber, Fritz	1
	Haber-Bosch Process	2
	Habersham, James	3
	Habit	4
	Habitat	5
	Habsburg	6
Hac....	Hacienda	7
	Hackberry	8
	Hackmatack	9
	Hackney	10
Had....	Hadassah	11
	Haddock	12
	Hader	13
	Hades	14
	Hadj	15
	Hadrian	16
	Hadrian	17
	Hadron	18
Hae....	Haeckel, Ernest	19
	Haema or Haemo	20
Haf....	Hafiz	21
	Hafnium	22
Hag....	Hagar	23
	Hagen	24
	Hagen, Walter	25
	Hagenbeck, Karl	26
	Hagerstown	27
	Hagfish	28
Hagg...	Haggai	29
	Haggard, Sir Henry	30
	Haggis	31
	Hague, Frank	32
	Hague, The	33
	Hague Peace Conferences	34
Hah....	Hahn, Otto	35
	Hahnemann, Samuel	36
Hai....	Haida Indians	37
	Haifa	38
	Haig, Earl	39
	Haik	40
	Haiku	41
Hail...	Hail	42
	Hail Columbia	43
	Hail to the Chief	44
	Haile Selassie I	45
	Haiphong	46
Hair...	Hair	47

STYLE I TYPE A

Hair (continued)--Hale Track 2

Hair...	Hair	
	Sec. 1, The Importance of Hair.......	1
	Sec. 2, The Structure of Hair........	2
	Sec. 3, How Hair Grows...............	3
	Hair Snake............	4
	Hairbell..............	5
	Haircloth.............	6
Haird..	Hairdressing..........	7
	Sec. 1, Through the Ages...........	8
	Sec. 2, Steps in Hair Styling........	9
	Sec. 3, Steps in Hair Care...........	10
	Sec. 4, Careers in..	11
	Hairworm..............	12
	Haise, Fred, Jr.......	13
Hait...	Haiti	
	Sec. 1, Introduction and Facts in Brief...............	14
	Sec. 2, Government, People, and Land....	15
	Sec. 3, Economy and History.............	16
Haj....	Hajj..................	17
Hak....	Hake..................	18
	Hakim.................	19
	Hakluyt, Richard......	20
Hal....	Halas, George.........	21
	Halcyon Days..........	22
	Haldane, William......	23
	Haldimand, Sir Frederick.............	24
Hale...	Hale, Edward..........	25
	Hale, George..........	26

Haber--Hair Track 1

Hab....	Haber, Fritz..........	1
	Haber-Bosch Process...	2
	Habersham, James......	3
	Habitat...............	5
	Habsburg..............	6
Hac....	Hacienda..............	7
	Hackmatack............	9
	Hackney...............	10
Had....	Hadassah..............	11
	Hader.................	13
	Hades.................	14
	Hadj..................	15
	Hadrian...............	16
	Hadron................	18
Hae....	Haeckel, Ernst........	19
Haf....	Hafiz.................	21
Hag....	Hagar.................	23
	Hagen.................	24
	Hagen, Walter.........	25
	Hagenbeck, Karl.......	26
	Hagerstown............	27
Hagg...	Haggai................	29
	Haggis................	31
	Hague, Frank..........	32
	Hague, The............	33
	Hague Peace Conferences...........	34
Hah....	Hahn, Otto............	35
Hai....	Haida Indians.........	37
	Haifa.................	38
	Haig, Earl............	39
	Haiku.................	41
Hail...	Hail..................	42
	Hail Columbia.........	43
	Haile Selassie I......	45
	Haiphong..............	46
Hair...	Hair..................	47

STYLE I TYPE C

Haber--Hair Track 1

Hab....	Haber, Fritz	1
	Habersham, James	3
	Habitat	5
Hac....	Hacienda	7
	Hackmatack	9
Had....	Hadassah	11
	Hader	13
	Hadj	15
	Hadrian	16
Hae....	Haeckel, Ernst	19
Haf....	Hafiz	21
Hag....	Hagar	23
	Hagen	24
	Hagerstown	27
Hagg...	Haggai	29
	Haggis	31
	Hague, Frank	32
	Hague Peace Conferences	34
Hah....	Hahn, Otto	35
Hai....	Haida Indians	37
	Haig, Earl	39
Hail...	Hail	42
	Haile Selassie I	45
Hair...	Hair	47

STYLE II TYPE A

Haber--Hair Track 1

Hab.... Haber, Fritz--1
Haber-Bosch Process--2
Habersham, James--3
Habit--4
Habitat--5
Habsburg--6
Hac.... Hacienda--7
Hackberry--8
Hackmatack--9
Hackney--10
Had.... Hadassah--11
Haddock--12
Hader--13
Hades--14
Hadj--15
Hadrian--16
Hadrian--17
Hadron--18
Hae.... Haeckel, Ernst--19
Haema or Haemo--20
Haf.... Hafiz--21
Hafnium--22
Hag.... Hagar--23
Hagen--24
Hagen, Walter--25
Hagenbeck, Karl--26
Hagerstown--27
Hagfish--28
Hagg... Haggai--29
Haggard, Sir Henry--30
Haggis--31
Hague, Frank--32
Hague, The--33
Hague Peace Conferences--34
Hah.... Hahn, Otto--35
Hahnemann, Samuel--36
Hai.... Haida Indians--37
Haifa--38
Haig, Earl--39
Haik--40
Haiku--41
Hail... Hail--42
Hail Columbia--43
Hail to the Chief--44
Haile Selassie I--45
Haiphong--46
Hair... Hair--47

STYLE II TYPE B

Haber--Hair Track 1

Hab.... Haber, Fritz--1
Haber-Bosch Process--2
Habersham, James--3
Habitat--5
Habsburg--6
Hac.... Hacienda--7
Hackmatack--9
Hackney--10
Had.... Hadassah--11
Hader--13
Hades--14
Hadj--15
Hadrian--16
Hadron--18
Hae.... Haeckel, Ernst--19
Haf.... Hafiz--21
Hag.... Hagar--23
Hagen--24
Hagen, Walter--25
Hagenbeck, Karl--26
Hagerstown--27
Hagg... Haggai--29
Haggis--31
Hague, Frank--32
Hague, The--33
Hague Peace Conferences--34
Hah.... Hahn, Otto--35
Hai.... Haida Indians--37
Haifa--38
Haig, Earl--39
Haiku--41
Hail... Hail--42
Hail Columbia--43
Haile Selassie I--45
Haiphong--46
Hair... Hair--47

STYLE II TYPE C

Haber--Hair Track 1

Hab.... Haber, Fritz--1
Habersham, James--3
Habitat--5
Hac.... Hacienda--7
Hackmatack--9
Had.... Hadassah--11
Hader--13
Hadj--15
Hadrian--16
Hae.... Haeckel, Ernst--19
Haf.... Hafiz--21
Hag.... Hagar--23
Hagen--24
Hagerstown--27
Hagg... Haggai--29
Haggis--31
Hague, Frank--32
Hague Peace Conferences--34
Hah.... Hahn, Otto--35
Hai.... Haida Indians--37
Haig, Earl--39
Hail... Hail--42
Haile Selassie I--45
Hair... Hair--47

APPENDIX C

EXAMINER INSTRUCTIONS AND SUBJECT DATA RECORD

Notes for the Examiner

1975 Written Index Study

1. The purpose of the study is to find out which of several (6) index styles is easiest to use.

2. Start timing as soon as cue card is given to the subject. Stop when subject starts to respond.

3. Self-corrections are permissible, if spontaneous.

4. Practice items:

   Give all necessary help to impart understanding

   Subjects should have all index pages (3) available for for use with all practice items.

   Starting with item 6, time items.

5. Sequence of the three indexes to be used with the test should be determined prior to the second session.

6. Test items:

   Give no assistance

   Items 1, 9, and 17 (the first ones with the three indexes) should be sought with the pamphlets closed but positioned correctly. Search for all other items should be initiated from the correct page of the preceding item. This means that if a subject misses an item by a whole page, the examiner will have to flip to the correct page.

Each subject will use only one index style (I or II); however, each will use all three lengths (A, B, C) within the style he is using.

Attempt to use four braille and four large type subjects at each of grade levels 7-12. Of these, two of each should use Style I materials and two should use Style II materials. The latter should be determined by the flip of a coin.

For each group of six (see design), sequence of indexes to be presented can be determining by drawing from prepared slips that contain the six permutations of A, B, C.

SUBJECT DATA RECORD--1975 WRITTEN INDEX STUDY

Name______________________ Sex____ Grade___ Dates______________________

School__________________________ Reading Medium______________________

Examiner__________________________ Schedule____________________________

Session One

introduce self

describe purpose of study and that it will require two class periods

ask if student would be willing to participate yes no

ask if student is available for next scheduled session yes no

administer Alphabetical Screening Task

number correct ______

if 8 or more, review those items missed and continue

if 7 or less, dismiss student courteously

Practice

describe format of the three practice sheets

guide words and sides noted at top

words listed alphabetically--note word for word alphabetization (e.g., bullet)

note some articles have sections

note items are related to item numbers

not all items are listed on the index--this can be determined from the item numbers

disregard the key column (e.g., C-4, C-5, D-1, etc.)

continue with practice items--have subject respond with side and item number for each--with item six, time practice items

PRACTICE ITEMS--INDEX DESIGNS

1.	Beard, Daniel	I	9	Side 1	
2.	Beaumont, William	N	30	Side 1	
3.	Bear--Kinds of Bears	I	2c	Side 1	
4.	Beauty	N	32	Side 1	
5.	Bebop	I	40	Side 2	
6.	Bordeaux	N	16	Side 3	Time________
7.	Born, Max	I	37	Side 4	Time________
8.	Borromeo, Saint Charles	I	45	Side 4	Time________
9.	Bunyan, John	N	42	Side 6	Time________
10.	Bulbul	I	1	Side 5	Time________
11.	Bulganin, Nikolai	N	3	Side 5	Time________
12.	Bede	I	53	Side 2	Time________
13.	Boric Acid	I	31	Side 4	Time________
14.	Burgos	I	67	Side 6	Time________
15.	Buonarroti, Michelangelo	N	44	Side 6	Time________
16.	Bullfighting	N	19	Side 5	Time________
17.	Bullhead	N	22	Side 5	Time________
18.	Bee--Introduction and Interesting Facts	I	61a	Side 2	Time________
19.	Booth	I	8	Side 3	Time________
20.	Burckhardt, Jakob	N	53	Side 6	Time________
21.	Borax	N	14	Side 3	Time________
22.	Boston	I	59	Side 4	Time________
23.	Beckett, Samuel	I	46	Side 2	Time________
24.	Boone, Daniel	I	1	Side 3	Time________
25.	Bunting	N	40	Side 6	Time________
26.	Buna	I	29	Side 6	Time________
27.	Bunsen Burner	I	39	Side 6	Time________

Session Two

Index style to be used: I II Length sequence: __________

familiarize subject to test format using index length to be used first

guide words and track

some indexes continued on next page

key letters in column down left side of page--using these the alphabetical position of a word can be found quickly

numbers related to items

some items continued on the next page

explain that not all items will be listed on the index and that their item numbers have to be determined from the preceding and following item numbers

on braille indexes--page numbers in upper right corner of odd pages

Tell the subject that today you will ask him to find some item on these indexes and that for each you will want to know the track number and the item number.

Tell the subject that you will be timing him/her, so to be sure and find the items as quickly as possible without making mistakes.

Wording for questions:

Tell me the track number and the item number for ________. (give cue card)

Now find the track and the item number for section ____ of the article on _______. It is entitled _______. (give cue card)

Maximum time for each test item: 2 minutes

Test

length A B C

1. Hale, Edward Track 2 #25 A-B-C

Track__________ Item No.________ Response Time____________________

2. Hammerfest Track 4 #37 A-B-NC

Track__________ Item No.________ Response Time____________________

3. Hackberry Track 1 #8 A-NB-NC

Track__________ Item No.________ Response Time____________________

4. Hallmark Track 3 #41 A-B-C

Track__________ Item No.________ Response Time____________________

5. Halide Track 3 #20 A-NB-NC

Track__________ Item No.________ Response Time____________________

6. Hague Peace Conferences Track 1 #34 A-B-C

Track__________ Item No.________ Response Time____________________

7. Hamilton (Ontario), Sec. 1,
   Introduction & Facts
   in Brief Track 4 #21 A-B-C

Track__________ Item No.________ Response Time____________________

8. Haley, Gail Track 3 #10 A-B-NC

Track__________ Item No.________ Response Time____________________ length A B C

9. Hair, Sec. 3, How Hair
Grows Track 2 #3 A-B-C
Track__________ Item No.________ Response Time____________________

10. Haifa Track 1 #38 A-B-NC
Track__________ Item No.________ Response Time____________________

11. Hamlet Track 4 #31 A-B-C
Track__________ Item No.________ Response Time____________________

12. Hamadan Track 4 #12 A-NB-NC
Track__________ Item No.________ Response Time____________________

13. Hale, Nathan Track 3 #2 A-B-NC
Track__________ Item No.________ Response Time____________________

14. Habersham, James Track 1 #3 A-B-C
Track__________ Item No.________ Response Time____________________

15. Haise, Fred, Jr. Track 2 #13 A-NB-NC
Track__________ Item No.________ Response Time____________________

16. Halicarnassus,
Mausoleum at Track 3 #19 A-B-C
Track__________ Item No.________ Response Time____________________

length A B C

17. Haiti, Sec. 2, Government,
People, & Land Track 2 #15 A-B-C

Track__________ Item No.________ Response Time____________________

18. Hades Track 1 #14 A-B-NC

Track__________ Item No.________ Response Time____________________

19. Hals, Frans Track 4 #4 A-B-C

Track__________ Item No.________ Response Time____________________

20. Hamelin Track 4 #17 A-NB-NC

Track__________ Item No.________ Response Time____________________

21. Halas, George Track 2 #21 A-B-C

Track__________ Item No.________ Response Time____________________

22. Hall, James Track 3 #27 A-B-C

Track__________ Item No.________ Response Time____________________

23. Hagfish Track 1 #28 A-NB-NC

Track__________ Item No.________ Response Time____________________

24. Halley's Comet Track 3 #38 A-B-NC

Track___________ Item No._______ Response Time____________________

STUDY IV

EVALUATION OF AN INDEXING CASSETTE SYSTEM AS A REFERENCE SOURCE

June E. Morris, Bobby G. Phelps, and Deborah G. Hill

Abstract

An indexing cassette reference system was developed and subjected to a field trial in which 24 legally blind subjects from grades 7-12 were taught to use it and then tested on their skill at locating entries in a recorded sample from an encyclopedia. Subjects using braille and large type, respectively, were able to locate 87% and 85% of the entires correctly. For those located correctly, the average per item times were 76 seconds and 72 seconds for subjects using braille and large type, respectively. Subjects were able to locate and operate various features of the indexing cassette player, an integral component of the cassette reference system, with 94% accuracy. However, the reliability of the players' indexing capability was only 88% which was below the criterion of 98% set for this function. In summary, results indicated that blind students could use the cassette reference system with an acceptable degree of accuracy and within appropriate time constraints, but that the indexing cassette player required further refinement to improve the reliability of its indexing capability.

STUDY IV

EVALUATION OF AN INDEXING CASSETTE SYSTEM AS A REFERENCE SOURCE

Previous research has resulted in the development of a special disc recording system which enables entry at specific points on a disc and the successful demonstration of the system's usefulness for blind students in a reference application (Morris, Nolan, & Phelps, 1973; Study I; Study II). Initial plans were to apply this system, the Aural Study System, in production of a recorded edition of The World Book Encyclopedia (Field Enterprises, 1973a). However, these initial plans had to be changed when the production engineered playback device could not be produced at an economically feasible price by the American Printing House for the Blind. This meant that alternatives had to be sought and provided the impetus for exploration of the application of recent developments in cassette player technology for the same purpose. For the first time, cassette player components were available that would make possible an indexing application at a reasonable cost. Additionally, such a player could be manufactured in-house by the American Printing House for the Blind. Exploration of such a cassette system could result in the identification of an attractive and feasible alternative to the disc system originally developed.

Working models for such a player were developed and the other components of an aural reference system, the recordings and their accompanying written indexes, adapted for use as part of a cassette system. The purpose of this study was to evaluate the usefulness of the combined package, the new Cassette Reference System, by subjecting it to a field trial.

Method

Subjects

All subjects were legally blind students enrolled in grades 7 through 12. Subjects included 12 who used braille and 12 who used large type. For each reading type, subjects were drawn from the various grades as follows: 1 from grade 7, 3 from grade 8, and 2 from each of grades 9, 10, 11, and 12. Only students who demonstrated a working knowledge of how to alphabetize words were included as subjects. With the exception of one subject from the Kentucky School for the Blind who served as a substitute for one who had become ill, all subjects were students at the Texas School for the Blind.

Materials

There are three basic components to the Cassette Reference System. These are an indexing cassette player, indexed cassettes containing the recorded reference material, and a written index giving the index information needed to locate specific articles.

Indexing cassette player. Figure 1 shows the indexing cassette player with the cover off. The six square buttons extending from left to right across the upper left portion of the slanting front panel are marked *P*, *S*, *R*, with an arrow pointing to the left, with an arrow pointing to the right, and *F*. These are the controls for play, stop, rewind, skip-back, skip-forward, and fast forward, respectively. The braille labels over the buttons read *p*, *s*, *r*, *sb*, *sf*, and *f*. To the right of the square buttons is a round button located in the upper right portion of the front panel. This button initiates the automatic search. Three round dials adorn the lower portion of the front panel. The one on the left is the track selector. It has four positions which are labeled in brialle and print *A*, *B*, *C*, and *D*. These are at the clock positions of 10, 11, 1, and 2, respectively. The middle and right dials are used to set index numbers of the desired entries into the player. The middle dial is used to set tens and the right dial to set units. Both are numbered from 0, at the 7 o'clock position, clockwise to 9, at the 5 o'clock position. To set the number 48, the tens dial would be set at 4 and the units dial would be set at 8. With the exception of the last three positions of the tens dials which are not labeled in braille (these were not used in the field trial) the dial positions are labeled in braille and print. However, as each position has a definite stop, the dials can be set by counting the stops as well as by reading the numbers.

The top deck of the player contains the cassette holder, slightly to the left of center, and the volume and tone controls. Finger space on both sides of the cassette holder enables the cassette to be removed without an eject mechanism. The volume and tone controls are to the right of the cassette holder, the volume being to the front of the tone. Both are recessed in the top deck and mounted vertically.

The slanting part of the player to the rear of the top deck contains the speaker. Mounted on its right side is the on-off switch.

With the cover attached, the player weighs 12.50 pounds (5.67 kg) and measures 6.75 inches (17.14 cm) in height X 10.25 inches (26.04 cm) in width X 13.25 inches (33.66 cm) in length. These dimensions include the handle, in repose; the hinges; and the feet. The player operates on 120 volts AC.

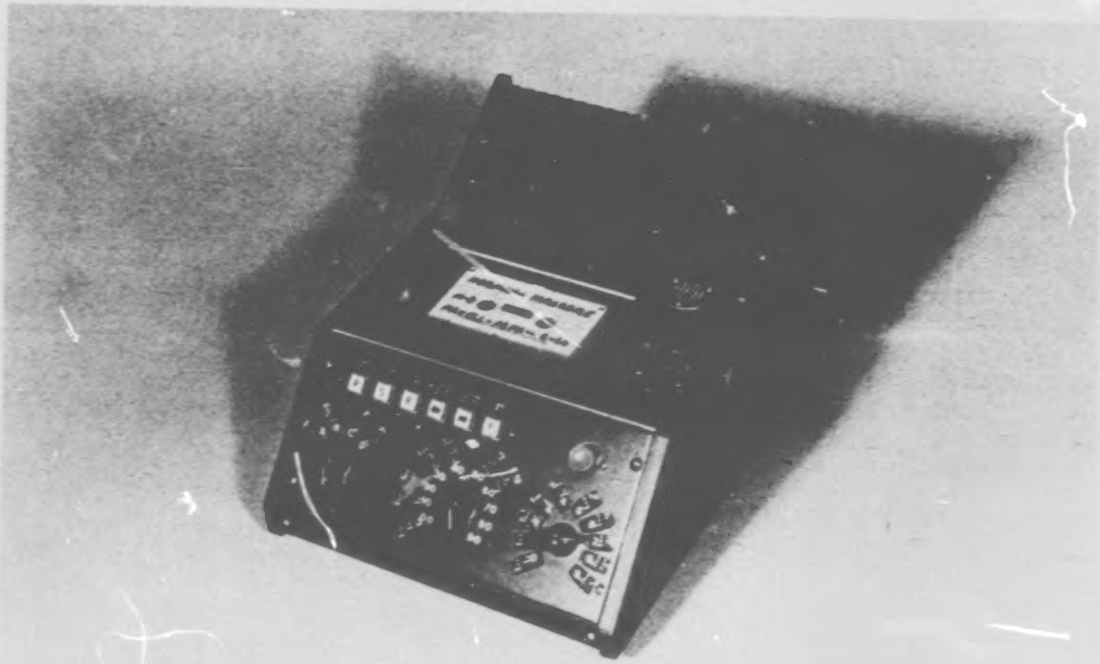

Figure 1. Indexing cassette player

The basic unit of this 4-track player is a cassette deck manufactured by the Economy Company of Oklahoma City. This deck differs from other available decks in that all functions are accomplished electronically rather than mechanically. These include normal play, stop, rewind, skip-back, skip-forward, and fast forward. This deck has been modified to provide for two speed operation: 15/16 ips and 60 ips. To accomodate this shift, a clutch has been designed and incorporated. The slow speed is used for play and the fast speed for search.

Electronics have been designed for use with the deck that enable a user to locate up to 99 index points on a track. These index points are located through response by the equipment to a series of 50 Hz tones placed as desired on the tape. To find any given point on the tape, the user must first determine the ordinal position of the desired place through reference to a written index. To find the desired entry point on the cassette, the user sets the number indicating the ordinal position into the selector dials of the player. He then activates the player's search control, the motor goes into high speed, the tape drive engages, and a pulse counting network counts index tone signals on the tape until their accumulated number matches that entered into the player. At this time the tape drive disengages, normal speed of play is engaged, the tape drive engages again, and the audio content of the tape is played. Average search time to locate an index point on the tape is 30 seconds. To start search for a second entry, the tape first must be rewound to the beginning, which is accomplished by pushing the rewind button. Rewind requires only about half as much time as search.

Indexed cassettes. Two cassettes were used in the field trial. Each contained a recording of approximately 4 hours in length from The World Book Encyclopedia (Field Enterprises, 1973b). The content for each was recorded professionally in the Talking Book Studios of the American Printing House for the Blind. The cassettes were 4-track, recorded at 15/16 ips. Each contained an hour of recording on each track. They were distinguished by two special features. First, all four tracks of each were recorded in the same direction. Second, immediately preceding each encyclopedia entry and each major section of long articles a 50 Hz tone was recorded.

One cassette, used in training, contained the section from Haber, Fritz through Hammet, Dashiell. The other, used in testing, contained the section from Herman, Woody through Hiroshige, Ando. These selections were chosen for use because they appeared representative of the type of material found throughout the encyclopedia and because neither contained any extremely long article.

An anticipated problem was that the tapes might break or tangle as they would be under greater stress than normal because of the high speed operation of the player. In order to combat this, it was hypothesized that good quality tape and cassette containers should be used, and that C-60s would be more reliable than C-90s as the tape used in C-60s is normally thicker than that used in C-90s. Several types of containers and tapes were used in the field trial.

Written indexes. Written indexes are an essential component of the Cassette Reference System and were provided in braille and large type (18-point by American Printing House standards) for use with both cassettes used in the field trial. They were designed in the format identified in Study III as best and, therefore, designated for use in subsequent research. In this format approximately 75% of the encyclopedia entries are listed. Specifications for the design are given in Study III. Copy for one of the written indexes used appears in Appendix A. It reflects the format used in the large type edition. The only difference in the braille edition of the index was that a single column format was used rather than a double column.

Alphabetical screening test. An alphabetical screening test was used to assure that all students who participated as subjects be reasonably proficient at alphabetizing words. The test used was provided in braille and large type (18-point) and is shown in Study III.

Subject data record form. A copy of the subject data record form appears in Appendix B. Separate forms were used for each subject. They provided for a full record of each subject's performance and served as a checklist for the examiners for all phases (preliminary information, training program, practice items, and work sample test) of subject involvement.

Training program: A three session training program was designed modeled after those used in previous studies of the usefulness of recorded reference materials. The training program set forth a consistent technique for familiarizing subjects with the equipment and materials and specified practice tasks and items to be located. These latter were carefully selected to be representative of the types of entries presented in the encyclopedia and to be well distributed throughout the practice materials. Activities included in the three training sessions were:

Session One: Introduction

Information about the study

Specific information about subject involvement

Student's informed consent to participate

Administration of alphabetical screening test

Familiarization of subject to written index

Practice using written index

Session Two: Familiarization of subject to indexing cassette player

Practice setting dials

Familiarization of subject to indexed cassettes

Practice with Cassette Reference System

Session Three: Review

Practice with Cassette Reference System

Test: A work sample test containing 12 items was designed and administered during the fourth session. The items were selected from the encyclopedia in such a way as to assess mastery of the various tasks involved in use of the Cassette Reference System. Test items were deliberately distributed throughout the test materials which consisted of one 4-hour cassette and its accompanying written index. Five scores were required for each location item. These were: (a) accuracy of use of written index, (b) time required to use written index, (c) accuracy of setting dials on indexing cassette player, (d) time required to set dials and activate player's search mode, and (e) accuracy of player's search function.

Cue cards. Cue cards were provided in braille and large type for all practice and test items. Braille cards were prepared on a braillewriter in standard grade 2 braille and large type ones were typed on a large type typewriter.

Procedure

Initially, potential subjects were selected by school personnel using four criteria. These were: (a) two braille and two large type students from each of grades 7 through 12, (b) students who were likely to possess the required alphabetizing ability, (c) students whose school work and extracurricular schedules would allow them to participate, and (d) students who agreed they would be willing to participate. Where more potential subjects were available than required, those initially chosen were those with the fewest scheduling problems.

All potential subjects were screened on their alphabetical skills through use of the alphabetical screening test. This test was administered at the beginning of the first session on an individual basis. As good alphabetical skills are a prerequisite for efficient use of reference materials, only students demonstrating such skill by scoring 80% or better on the test were used as subjects in the field trial. This was done to assure that the results of the field trial not be confounded by subjects' inability to determine the appropriate alphabetical position of sought entries.

Once subjects were identified, each worked individually with an experimenter for four sessions of approximately 50-minutes each. Generally, the four sessions were held on 4 consecutive school days. As outlined under the section on Materials, the first three sessions were training sessions and the fourth one a test session. Imposition of time limits on the test tasks involving location of items permitted each subject to attempt each task. The time line for each test location task was:

15 seconds	to hand cue card, pronounce, and review spelling
90 seconds*	to use written index

60 seconds*	to set dials and activate player's search mode
30 seconds	average time to locate item in recording
07 seconds	to listen to verify correct item located
15 seconds	average rewind time
217 seconds	TOTAL

*maximum time allowed

A small pilot test was conducted prior to any data collection to verify that the tasks and procedures were appropriate, that the time limits for the test location tasks were realistic, and to give the experimenters an opportunity to standardize their technique.

Results

Criteria used in evaluating results of the field trial were:

1. that subjects using braille should be able to locate 80% (average performance for the group) of the test items correctly within the time limits

2. that subjects using large type should be able to locate 80% (average performance for the group) of the test items correctly within the time limits

3. that the indexing cassette player should function with 98% or better reliability

Data relating to subject use of the Cassette Reference System were analyzed separately for subjects using braille and large type. These data were found to meet the first two criteria. Of the items sought by subjects who used brialle and large type, 87% and 85%, respectively, were sought correctly. When these data were broken down into the two tasks involved in the search process, it was found that braille and large type subjects located the correct index information from the written indexes for 89% and 86% of the items, respectively, and that they set the dials of the player correctly 97% and 99% of the time, respectively.

The average per item time required by braille subjects to use the written index was 37.4 seconds (SD = 21.0 seconds) and by large type subjects was 35.0 seconds (SD = 19.6 seconds). The average time, per item, required by braille subjects to set the player's dials was 11.0 seconds (SD = 7.4 seconds). This time for large type subjects was 8.6 seconds (SD = 3.8 seconds). These figures were computed using maximum time scores where the correct response did not occur within the time limits. Average per item location times for items located correctly were 76 seconds for subjects using braille and 72 seconds for those using large type. In the computation of these latter, the mean search time of the indexing cassette player, 30 seconds, was used.

Thus, with the appropriate cassette on a player, blind persons using braille and large type can locate a desired item on that cassette in approximately 85 and 81 seconds, respectively. These figures represent the sum of the average times required for using the written index, the average times required to set the dials and activate the search mode, the average time required to run the tape to the desired point (30 seconds), and the approximate time required (6-8 seconds) to hear the entry word(s) pronounced after the player stops at the item's tone signal and shifts to the play mode.

A record was kept throughout the practice and test sessions of the reliability of the players' search function. Data on the 826 trials run at the Texas School for the Blind were analyzed to obtain a reliability measure for this function. The percentage of accurate locations was 88.5%, which was below the criterion of 98%. It was noted that there were differences in performance between the four players used in the field trial and between the cassettes used. The most common problem, which was responsible for 65.3% of the malfunctions, was that the players stopped one index position beyond the correct one (e.g., if the dials were set for track C number 31, the player would stop at number 32 on track C).

The data on use of the written index revealed that nonindexed items were slightly more difficult to find than indexed ones and that subheadings of main entries were a little more difficult to find than main entries themselves. Data supporting this statement are: (a) For entries sought by subjects using braille, 90% of indexed items were correct as compared with 86% of nonindexed items, and the average per item times for these were 34 and 38 seconds, respectively. (b) for items sought by subjects using large type, 88% of indexed items were correct as compared with 81% of nonindexed items. The respective per item times for these were 32 and 37 seconds. (c) Comparative figures for main entries and subheadings sought correctly by braille subjects were 89% and 88%, respectively. The difference in the two showed in the average per item time required which was 33 seconds for main entries and 44 seconds for subheadings. (d) Subjects using large type sought 88% of main entries correctly while only 79% of the subheadings were correct. The per item times for the two were 33 and 34 seconds, respectively. Although these data show some differences exist in the accuracy and time spent seeking index information for indexed and nonindexed items and for main entries and subheadings, the differences do not appear to be great enough to be of practical importance.

All subjects were tested on their use of the various features and operations of the indexing cassette player. Overall, subjects performed with 94% accuracy. Braille and large type subjects performed similarly. The only problem found in use was confusion between the tone and volume controls and the direction to turn the tone control for more bass or treble. This reflected two things. First, these dials were not labeled; second, in training these operations were not practiced after first being introduced. Table 1 reports recognition and use for each feature of the player.

Table 1

Percentage of Recognition and Manipulative Operations Performed
Correctly on the Indexing Cassette Player
by Braille and Large Type Subjects (N = 24)

Feature or operation	Percentage correct
1. on-off switch	100%
2. turn on	100%
3. tone control	75%
4. set bass	79%
5. set treble	75%
6. volume control	92%
7. set loud	92%
8. set low	96%
9. fast forward button	92%
10. stop button	100%
11. search button	100%
12. skip-forward button	79%
13. play button	100%
14. skip-back button	83%
15. rewind button	100%
16. track dial	100%
17. set track C	100%
18. number dials	100%
19. ones dial	100%
20. tens dial	100%
21. set 23	96%
22. remove cassette	100%
23. insert cassette	96%

In use of the system, the examiners noted that some of the subjects counted clicks rather than using the labels to set the dials. Another observation was that some problems that occurred in use of the written index were actually alphabetizing problems.

Subjects were asked what ideas they had for improvement. Suggestions were few but were noted as follows:

eject mechanism needed for cassette

lid needed for cassette holder

braille labels should be improved

earphone jack needed

search button should be highly visible

player should search from one to another on a track without first having to be rewound

push buttons preferred to dials

player should be a little smaller for home use

Discussion

A basic assumption underlying this field trial was that, if subjects could demonstrate use of the equipment and materials by locating specific items on the recording upon demand, then they will have demonstrated they have learned to locate and operate the various features of the player and will have learned to use the written index. Subjects participating in the field trial learned to use the Cassette Reference System with little difficulty. Their performance met or exceeded criteria. Data presented in Table 1 attest to the fact that they learned to locate and operate the various features of the player.

The reliability of the Cassette Reference System did not meet criterion. Subsequently, two modifications of the players were made that should bring performance up to criterion. These modifications were (a) a high speed circuit was changed and (b) the capstan mechanism was changed to engage prior to the player's going into high speed. Subsequent testing of the modified player indicated that, with these changes, reliability may be between 99 and 100%.

Further changes necessary for the production model of the player would be labels for all controls, reposition of the dials to accomodate braille numbers for all positions, provision of a highly visible search button, and provision of an earphone jack. Another feature to be considered might be an eject mechanism for the cassette in which case a door for the cassette holder would be needed. Other than establishing reliability, future evaluation of the indexing cassette player should include testing under differing environmental conditions and for determination of wear.

Should the Cassette Reference System find application as an encyclopedia source, additional information will be required regarding how best to package the cassettes and how best to present the written indexes. Estimates are that The World Book Encyclopedia (Field Enterprises, 1973a) could be contained on approximately 300 cassettes of the type used in this study. Each would require a written index in both braille and large type. Cassettes and their accompanying indexes could be contained together in book form, the cassettes fitting into receptacles molded into the cover, or the cassettes could be numbered and stored in cabinets and the indexes bound separately as a set of accompanying books.

In summary, the field trial of the Cassette Reference System demonstrated that visually handicapped students could learn to use it to locate recorded encyclopedia references with an acceptable degree of accuracy and within resonable time constraints. Findings indicated that refinements were needed to improve the reliability of the indexing cassette player. Such refinements subsequently were made. Pending the results of further evaluation, it appears that the Cassette Reference System may provide a feasible means for providing a recorded encyclopedia that can be used by all braille and large type readers.

References

Field Enterprises Educational Corporation. The world book encyclopedia (22 vols.). Chicago: Author, 1973. (a)

Field Enterprises Educational Corporation. The world book encyclopedia (Vol. 9). Chicago: Author, 1973. (b)

Morris, J. E., Nolan, C. Y., Phelps, B. G. Aural study system for the visually handicapped: Description of the Aural Study System: Interim progress report no. 9 [Project No. 8-0046; Grant No. OEG-0-8-080046-2670(032)]. Louisville, Ky.: American Printing House for the Blind, 1973. (ERIC Document Reproduction Service No. ED 078 620)

APPENDIXES

APPENDIX A

WRITTEN INDEXES

Herman--Hess, R.   Track A

Herma..	Herman, Woody..........	1
	Hermaphrodite..........	2
	Hermes.................	3
Hermi..	Hermione..............	5
	Hermit.................	6
	Hermit Crab............	7
	Hermitage..............	9
	Hermitage, The.........	10
Hern...	Hernández, José........	11
	Herne, James A.........	13
	Hernia.................	14
Hero...	Hero...................	15
	Herod..................	17
	Herodias...............	18
Heroi..	Heroic Age.............	20
	Heroic Drama...........	21
	Heroic Verse...........	22
	Heron..................	24
	Heron's-Bill...........	25
	Héroult Process.........	26
Herp...	Herpes..................	27
Herr...	Herrera, Tomás..........	29
	Herrick, Robert.........	30
	Herring.................	31
Hers...	Herschel................	33
	Hersey, John............	34
	Hershey.................	35
	Hershey, Alfred.........	36
Hert...	Herter, C. A............	37
	Hertz...................	39
	Hertz, Gustav...........	40
	Hertzsprung, Ejnar......	42
	Hertzsprung-Russell Diagram.................	43
Herz...	Herzberg, Gerhard.......	44
	Herzen, A. I............	46
	Herzl, Theodor..........	47
Hes....	Hesburgh, T. M..........	49

Herman--Hess, R.   Track A

Hes.... Hesiod................. 50

Hesperia............... 51

Hesperornis............ 53

Hess... Hess, Dame Myra........ 55

Hess, Rudolf........... 56

Hesse--High Fidelity Track B

Hess... Hesse.................. 1
Hesse, Hermann......... 2
Hessian............... 3
Hessite................ 5
Het.... Hetch Hetchy........... 6
Heteronym.............. 7
Hev.... Hevea.................. 8
Hew.... Hewes, Joseph.......... 10
Hex.... Hexagon................ 11
Hexahedron............. 13
Hexameter.............. 14
Hexapod................ 15
Hey.... Heydrich, Reinhard..... 16
Heyrovský, J........... 18
Heyward, Du Bose....... 19
Heywood, Thomas........ 21
Hez.... Hezekiah............... 22
Hi..... Hi Fi.................. 23
Hialeah................. 24
Hiawatha................ 26
Hib.... Hibbing................. 27
Hibernia................ 29
Hibernians in America, Ancient Order of........ 30
Hic.... Hiccup.................. 32
Hickam Air Force Base... 33
Hickok, "Wild Bill," J. B................... 34
Hickory................. 35
Hickory Pine............ 36
Hid.... Hidalgo................. 38
Hidalgo Y Costilla, M... 39
Hidatsa Indians......... 40
Hideyoshi............... 42
Hie.... Hierarchy............... 43
Hiero................... 45

Hesse--High Fidelity Track B

Hie.... Hieroglyphic........... 46

High... High Church............ 48

High Desert............ 49

High Fidelity, or Hi-Fi.................. 51

High German--Himalaya Track C

High... High German............ 1
High-Holder............ 2
High Jump.............. 3
High Mass.............. 5
High Point............. 6
High Point College..... 7
High School............ 9
Sec. 1, High Schools in the United States............... 10
Sec. 2, High Schools in Canada............ 11
Sec. 3, Secondary Schools in Other Countries............ 12
Sec. 4, Development of the American High School.......... 13
High Seas.............. 14
Highb.. Highball............... 15
Higher Criticism....... 17
Higher Education....... 18
Highl.. Highland Fling.......... 19
Highland Terrier........ 21
Highlands............... 22
Highway................. 23
Hij.... Hijra................... 25
Hik.... Hiking.................. 26
Hil.... Hilbert, David.......... 27
Hill.................... 29
Hill, Graham............ 30
Hill, Octavia........... 32
Hilla.. Hillary, Sir E. P....... 33
Hillel I................ 34
Hillman, Sidney......... 36
Hillsdale College....... 37
Hillyer, R. S........... 38
Hilt... Hilton, C. N............ 40
Hilton, Harold.......... 41
Hilton, James........... 42
Him.... Himalaya................ 44

Himalaya (continued)--Hiroshige Ando Track D

Him....	Himalaya (continued)...	1
	Himation...............	2
	Himmler, Heinrich......	3
Hin....	Hinayana...............	4
	Hindemith, Paul........	6
	Hindenburg.............	7
	Hindenburg Line........	9
Hindi..	Hindi..................	10
	Hindu-Arabic Numerals..	12
	Hindu Kush.............	13
	Hinduism...............	14
	Sec. 1, Beliefs of Hinduism.............	15
	Sec. 2, Hindu Worship..............	16
Hine...	Hines, Duncan..........	18
	Hines, "Fatha," E......	19
Hinn...	Hinnom, Valley of.......	20
	Hinshelwood, Sir C......	22
Hip....	Hip.....................	23
	Hippias.................	25
	Hippies.................	26
Hippo..	Hippocampus.............	27
	Hippocrene..............	29
	Hippodrome..............	30
	Hippolyta...............	31
	Hippopotamus............	33
Hir....	Hiram...................	34
	Hiram College...........	35
	Hiroshige Ando..........	37

APPENDIX B

SUBJECT DATA RECORD

CASSETTE REFERENCE SYSTEM STUDY

SUBJECT DATA RECORD

Name________________________ Sex____ School______________________

Grade_____ Reading Level________________ Experimenter________________

Week of________________________________ Schedule____________________

Reading Medium__________________________ Number of Years Using____________

If Braille, Any Useful Vision?____________________________________

Has Subject Ever Used An Encyclopedia?_____________________________

DAILY RECORD

Session One

Number correct on alphabetical screening device:

Understanding of written index:

Number of items attempted in written index practice:

Problems with alphabetizing:

Other:

Session Two

Number of items attempted for:

- Written index:
- Setting dials:
- Practice:

Use of written index:

Use of indexing cassette player:

Other:

Session Three

Number of practice items attempted:

Use of written index:

Use of indexing cassette player:

Other:

Session Four

Number of test items completed correctly within time limit:

Index:

Setting dials:

Any problems with use of written index:

Any problems with use of indexing cassette player:

Other:

CASSETTE REFERENCE SYSTEM STUDY

STARTING SETUPS FOR EACH SESSION

All Sessions

all equipment and materials should be placed on a table providing ample space

two chairs--one for the subject and one for the experimenter

as good lighting as possible in the testing environment

a room with as little additional noise and distractions as possible

experimenter will need practice cue cards for use during Session 1-3

experimenter will need subject data records, pencils, and stopwatch for use during Sessions 1, 3, and 4

experimenter will need test cue cards for use during Session 4

Session 1

table space in front of subject clear, initially

alphabetical screening task, in appropriate medium, and crayons cards with 3 practice questions

a four-track, APH-Modified Economy Company Indexing Cassette Player setup for use, but away from subject, initially

plugged into an electrical outlet

cassette should be wound ready to play, on the table to the left of the recorder

on-off switch--set "off"

track switch--set on track A

dials--set at 00 and 0

volume--set on 5

tone--set on 5

Session 2

player and materials on table in front of subject setup for use as described for Session 1

practice items continued from Session 1

Session 3

player and materials on table in front of subject setup for use as described for Session 1, except that the cassette should be in the player

practice items will be timed and recorded during Session 3

Session 4

player, recorded four-hour selection of the encyclopedia, and appropriate written index to be used for test

player on table in front of subject setup as for Session 3

Session 1

Introduce self; then, briefly tell the potential subject that you are going to be having some of the students at his/her school help you by learning how to use a new kind of recorded encyclopedia. Explain that those students who participate will spend approximately one class period (about 45 minutes--to be scheduled by the school) working with you--today and for the next 3 days during which time they will learn how to use a written index and an indexing cassette player to find items in a recorded edition of the encyclopedia. Explain to the student that in order to use the cassette encyclopedia efficiently, it is necessary that he/she be able to alphabetize words. Tell the student that in just a few moments, if he/she agrees to take part in the project, you will work through some sample questions with him/her and then you will give him/her an alphabetical screening device. If he/she can correctly alphabetize the words on the screening device, then you would like him/her to take part in the study. Then ask the student if he/she would be willing to take part.

__________YES __________NO

If the student seems reluctant or is not willing to participate, don't pressure.

Dismiss him/her politely.

If the student is willing, check with him/her to verify that he/she will be available for the next 3 days and has no insurmountable scheduling problems.

Administering "Alphabetical Screening Task"

Show the student the alphabetical screening device. Tell the student that you will work a few sample questions with him/her before you administer the alphabetical screening task. Then ask him/her to please read the instructions orally. Clarify instructions if necessary. After completing the 3 practice items, ask the student if he/she has any questions. Next, ask the student to complete the task. Tell him/her that he/she will have 20 minutes to complete the 10 questions and that if he/she finishes before the time is up he/she may check his/her answers.

if fail--thank, but dismiss (more than two items missed)

If pass--continue, as follows (eight or more items correctly alphabetized)

(Go over any of the 10 test items that the student missed.)

Then say:

> DURING THIS WEEK YOU ARE GOING TO LEARN HOW TO USE AN INDEXING CASSETTE PLAYER WITH A FOUR-TRACK INDEXED CASSETTE TO FIND ITEMS IN A RECORDED ENCYCLOPEDIA. BY THE END OF THE WEEK YOU WILL BE ABLE TO LOCATE RECORDED ENTRIES WITHOUT HELP FROM ME. DO YOU HAVE ANY QUESTIONS?

Session 1

Activities to Familiarize Subjects with the Indexing Cassette System

I. Familiarization to the written index

"The subject should be able to . . ."

A. Describe the index--note it is arranged alphabetically

1. guide words
--at the top

Examine the guide words together:
Haber--Hair
Hair (continued)--Hale
Hale--Halo
Halogen--Hammet

The guide words are the first and last words on the track, but not necessarily the first and last words found on each page.

2. continued articles

Look at guide words Haber--Hair
Hair (continued)--Hale

Notice article on Hair begins at the end of track A (#47) However, there was not enough tape on which to record the entire article and so the article on Hair is continued on track B.

3. tracks
--at the top

--tracks A, B, C, and D--some require only 1 page, some 2 or more pages

4. subheadings

Some articles are so long, such as Hair, that they are divided into sections. Point out the sections on Hair, Haiti, and Hamilton (Ontario).

5. cue letters

--to the left of the index words

--25 to 30% of the entries

Let the subjects examine the cue letters. Notice that several words usually come between the sets of cue letters. Show the subjects the method of systematic scanning.

6. numbers related to items

   --every entry in the encyclopedia is numbered consecutively according to word-by-word alphabetizing

   --75% of the entries are written on the index

   --each entry of the remaining 25% falls alphabetically between 2 entries

   --there is no more than 1 entry excluded between any 2 entries

   Show the subject some examples.

For practice, ask the subject to tell you the track and item number of some nonindexed items. For example, find:

Habit (Track A, #4)
Hakluyt, Richard (Track B, #20)

B. Explain verbally how to find any given index point

1. user must determine the ordinal position of the desired entry through reference to a written index

   a. if indexed, the number of the item will be on the written index

   b. if nonindexed, the number is determined from the preceding and following item numbers found on the written index

C. Explain verbally word-by-word alphabetizing

1. Each word is alphabetized according to the first word. Words separated by commas come before entries made up of several words.

   See entries 1-2 and 32-33-34 on track A. See entries 1-2-3-4-6-7 on track C.

   If subject is confused or needs more examples, see entries 24-25-26-27-29-30-32-33 on track C, and/or entries 19-20-21-22-23-24-25-26-27-29 and 36-37 on track D.

For practice, ask the subject where the following entries would be found:

Hair Snake (track B, #4)

Session 1

(continue in Session 2 if necessary)

Practice Without Player (15 minutes)

Procedure:

First, review spelling as shown on cue card.
Then have the subject:
- Use guide words
- Determine track of sought item from guide words
- Scan cue letters to determine approximate position of sought item
  - Use a segmented search technique
- Locate sought item or, if nonindexed, its position
- Determine item number of sought item
  - If indexed, read
  - If nonindexed, interpolate

1.	Haggai	I	Track A, #29
2.	Hall Effect	N	Track C, #31
3.	Hakim	I	Track B, #19
4.	Half-Life	N	Track C, #14
5.	Hague, The	I	Track A, #33
6.	Hall, James N.	N	Track C, #28
7.	Hammer Throw	I	Track D, #36
8.	Hamilton (Ohio)	I	Track D, #20
9.	Haircloth	N	Track B, #6
10.	Hair (find the beginning of the article on...)	I	Track A, #47
11.	Hairdressing, Sec. 2, Steps in Hair Styling	I	Track B, #9
12.	Hammet, Dashiell	I	Track D, #40
13.	Half-Breeds	N	Track C, #12
14.	Halogen	I	Track D, #1
15.	Halleck, Henry	N	Track C, #36

16.	Hague Peace Conferences	I	Track A, #34
17.	Haddock	N	Track A, #12
18.	Haleakala National Park	N	Track C, #8
19.	Hairworm	I	Track B, #12
20.	Haber-Bosch Process	I	Track A, #2
21.	Hagar	I	Track A, #23
22.	Haldimand, Sir Frederick	N	Track B, #24
23.	Halpern, Bernard	N	Track D, #3
24.	Halsted, William	I	Track D, #6
25.	Haiku	I	Track A, #41
26.	Haliburton, Thomas	I	Track C, #17
27.	Halcyon Days	N	Track B, #22
28.	Hamadan	N	Track D, #12
29.	Halloween	I	Track C, #42
30.	Halevi, Judah	I	Track C, #9

Comments:

Session 2

Activities to Familiarize Subjects with the Indexing Cassette System

II. Familiarization to the cassette player

"The subject should be able to. . ."

- A. Insert and remove cassette
    - 1. bar fits through hole in cassette case

      Notice bar turns when machine is "on."
- B. List verbally the features that are located on the player.
    - 1. Examine the top deck and name the features or controls:

      cassette holder, on-off switch, volume control, and tone control
    - 2. Discuss location of each of the features mentioned in B-1.
    - 3. Discuss the shape of each feature and its position relative to the sides of the player.
    - 4. Name the features discussed in B-1.
- D. List verbally the push button controls and dials on the front panel
    - 1. Discuss the location of the play button (P), stop button (S), rewind button (R), skip-back button (←), skip-forward button (→), fast forward button (F), and the search button.
    - 2. Discuss the use of each, how each is engaged and disengaged, each button's position relative to the others.

      Note that skip-back and skip-forward buttons are momentary (must be held in).
    - 3. Discuss the location of the dials.
    - 4. Discuss the use of each dial

      --setting the track (A, B, C, D)

      --setting the tens

      --setting the units
    - 5. Name the features discussed in C-1 and C-3.

D. Describe each control in respect to its shape and its operation

1. What is the shape of the on-off switch?
2. What is the shape of the volume and tone controls?
3. What is the shape of the track dial and the number dials?
4. What is the shape of the play, stop, rewind, skip-back, skip-forward, and fast forward buttons?
5. What is the shape of the search button?
6. Activate each control especially noting the various movements required.
7. Demonstrate engaging and disengaging each switch, control, dial, and button.
8. Touch any feature or control of the player upon command.

Practice Setting Dials on Player

Procedure:

Have subject set track dial first
Next have subject set tens dial
Last have him set units dial

---

1. B-22
2. A-1
3. C-10
4. B-13
5. A-40
6. D-7
7. A-55
8. C-9
9. D-34
10. B-48
11. D-63
12. C-36

Comments:

III. Familiarization to the encyclopedia cassette

"The experimenter should tell the subject. . ."

- A. The cassette is a four-hour selection recorded on a four-track, C-60 cassette
- B. Every entry has a tone signal which is counted electronically

  --99 index points are possible within each 1-hour recording
- C. Each new entry word and each subheading of an entry is indicated by "clicks"
- D. To examine the cassette tactually
- E. To place the cassette in the cassette holder and then to remove the cassette from the cassette holder

IV. Familiarization to the relationship between the written index and the indexing cassette player

"The subject should be able to . . ."

- A. Demonstrate how to find an indexed item
  - a. determine the track through use of guide words
  - b. determine the number of the item on the written index
  - c. set the dials
  - d. push the search button
- B. Demonstrate how to find a nonindexed item
  - a. determine the track through use of guide words
  - b. determine the number of the item from the preceding and following item numbers
  - c. set the dials
  - d. push the search button

V. If time permits, have subject start finding practice items as listed for Session 3.

Session 3

Procedure:

Initially, review all features of the player by having subject locate and operate feature--use checklist noting any problems
Have subject practice locating items--rewind while having subject use written index to locate next item in order to save time
Time all practice items
Note any malfunction of the player

Review of player:

_____ remove cassette

_____ insert cassette

_____ on-off switch

_____ tone control

_____ volume control

_____ play button

_____ stop button

_____ rewind button

_____ skip-forward button (momentary)

_____ skip-back button (momentary)

_____ push stop

_____ fast forward button

_____ push stop

_____ search button

dials:

_____ track dial

_____ tens dial

_____ units dial

Session 3

Practice Items (timed)

Notes to Experimenter: Tell the subject that today you will be timing him/her.

Rewind cassette while subject is using the index for the next item.

1. Here is the cue card for the item Hajj. (Give cue card.) Spell the item out loud for me (start timing as soon as subject spells item). Now tell me the track and item number for the item Hajj. (Index should be closed but right-side-up in front of subject.)

Track_________(B) Item No._________(17) Time_________

If incorrect, have subject continue searching until correct item is found, or until time runs out. Record all responses and their times.

Track_________ Item no._________ Time_________

Track_________ Item no._________ Time_________

Track_________ Item No._________ Time_________

If correct track and item number are not reported, tell the subject what they are. Give explanations as needed. THEN CONTINUE:

Now find Hajj on the cassette--Track B, item 17. (Start timing immediately as item number is spoken.)

Track dialed_________

Item No. dialed_________

Time required prior to pushing search button:_________
(Stop timing as soon as search button is engaged.)

Player function correctly?_________

Comments:____

2. Haifa

Track__________(A) Item No.__________(38) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

3. Hackberry

Track__________(A) Item No.__________(8) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

4. Halide

Track__________(C) Item No.__________(20) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

4. Halide (continued)

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

5. Hague Peace Conferences

Track__________(A) Item No.__________(34) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

6. Hamilton (Ontario), Sec. 1, Introduction and Facts in Brief

Track__________(D) Item No.__________(21) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

7. Halteres

Track_________(D) Item No._________(7) Time_________

Track_________ Item No._________ Time_________

Track_________ Item No._________ Time_________

Track_________ Item No._________ Time_________

Track dialed_________

Item No. dialed_________

Time required prior to pushing search button_________

Player function correctly?_________

Comments:____

8. Hall, James

Track_________(C) Item No._________(27) Time_________

Track_________ Item No._________ Time_________

Track_________ Item No._________ Time_________

Track_________ Item No._________ Time_________

Track dialed_________

Item No. dialed_________

Time required prior to pushing search button_________

Player function correctly?_________

Comments:____

9. Hairdressing, Sec. 3, Steps in Hair Care

Track_________(B) Item No._________(10) Time_________

Track_________ Item No._________ Time_________

Track_________ Item No._________ Time_________

Track_________ Item No._________ Time_________

9. Hairdressing, Sec. 3, Steps in Hair Care (continued)

Track dialed_________

Item No. dialed_________

Time required prior to pushing search button_________

Player function correctly?_________

Comments:____

10. Hammerfest

Track_________(D) Item No._________(37) Time_________

Track_________ Item No._________ Time_________

Track_________ Item No._________ Time_________

Track_________ Item No._________ Time_________

Track dialed_________

Item No. dialed_________

Time required prior to pushing search button_________

Player function correctly?_________

Comments:____

11. Hamlet

Track_________(D) Item No._________(31) Time_________

Track_________ Item No._________ Time_________

Track_________ Item No._________ Time_________

Track_________ Item No._________ Time_________

Track dialed_________

Item No. dialed_________

Time required prior to pushing search button_________

Player function correctly?_________

Comments:____

12. Halite

Track__________(C) Item No.__________(23) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

13. Hafnium

Track__________(A) Item No.__________(22) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

14. Hagfish

Track__________(A) Item No.__________(28) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

14. Hagfish (continued)

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:__________

15. Haiti, Sec. 2, Government, People, and Land

Track__________(B) Item No.__________(15) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:__________

16. Halley's Comet

Track__________(C) Item No.__________(38) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:__________

17. Halicarnassus, Mausoleum at

Track__________(C) Item No.__________(19) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

18. Haise, Fred, Jr.

Track__________(B) Item No.__________(13) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

19. Hamelin

Track__________(D) Item No.__________(17) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

19. Hamelin (contintued)

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

20. Hades

Track__________(A) Item No.__________(14) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

21. Haman

Track__________(D) Item No.__________(15) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

22. Halas, George

Track ________ (B)   Item No. ________ (21)   Time ________
Track ________   Item No. ________   Time ________
Track ________   Item No. ________   Time ________
Track ________   Item No. ________   Time ________

Track dialed ________

Item No. dialed ________

Time required prior to pushing search button ________

Player function correctly? ________

Comments: ____

23. Hallmark

Track ________ (C)   Item No. ________ (41)   Time ________
Track ________   Item No. ________   Time ________
Track ________   Item No. ________   Time ________
Track ________   Item No. ________   Time ________

Track dialed ________

Item No. dialed ________

Time required prior to pushing search button ________

Player function correctly? ________

Comments: ____

24. Habersham, James

Track ________ (A)   Item No. ________ (3)   Time ________
Track ________   Item No. ________   Time ________
Track ________   Item No. ________   Time ________
Track ________   Item No. ________   Time ________

24. Habersham, James (continued)

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

Session 4

Indexing Cassette System Test

Ask the subject if he/she has any questions. Then say: I AM GOING TO ASK YOU TO OPERATE THE VARIOUS FEATURES ON THE CASSETTE PLAYER.

X=subject did not operate features properly, note which feature was engaged erroneously

✓=subject operated features properly

---

1. Show me the on-off switch.______
2. Now turn the cassette player on.______
3. Show me the tone control.______
4. Show me where you would set the tone control for more bass.______
5. Show me where you would set the tone control for more treble.______
6. Where is the volume control?______
7. Show me where you would set the volume control for very loud.______
8. Show me where you would set the volume control so that the sound would be very low.______
9. Push the fast forward button.______
10. Push the stop button.______
11. Push the search button._______
12. Push the skip-forward button.______

    Push stop._______
13. Push the play button._______
14. Push the skip-back button.______

    Push stop.______
15. Push the rewind button.______
16. Show me the track dial.______

17. Set the dial on Track C.______

18. Show me the number dials.______

19. Which of the number dials is the setting for ones?______
for tens?______

20. Set the number dials on 23 for me.______

21. Remove this cassette for me.______

22. Insert the cassette for me.______

Now take a moment (give each subject 1 minute) looking over the new index which we'll be using today. (Note guide words at top of each page.)

1. Here is the cue card for the item Hewes, Joseph. (Give cue card.) Spell the item out loud for me (start timing as soon as subject spells item). Now tell me the track and item number for the item Hewes, Joseph. (Index should be closed but right-side-up in front of subject.)

Track__________(B) Item No.__________(10) Time__________(Max. 90 sec.)

If incorrect, have subject continue searching until correct item is found, or until time runs out. Record all responses and their times.

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

If correct track and item number are not reported, tell the subject what they are. THEN CONTINUE:

Now find Hewes, Joseph on the cassette--Track B, item 10. (Start timing immediately as item number is spoken.)

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button:__________(Max. 60 sec.)
(Stop timing as soon as search button is engaged.)

Player function correctly?__________

Comments:____

2. High School, Sec. 3, Secondary Schools in Other Countries

Track__________(C) Item No.__________(12) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

3. Heroin

Track__________(A) Item No.__________(23) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

4. Hesperia

Track__________(A) Item No.__________(51) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

4. Hesperia (continued--Track A, item 51)

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

5. Hindemith, Paul

Track__________(D) Item No.__________(6) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

6. Himalaya (find the beginning of the article on...)

Track__________(C) Item No.__________(44) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

7. Hermit Crab

Track__________(A) Item No.__________(7) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

8. Hide

Track__________(B) Item No.__________(41) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

9. Hiram

Track__________(D) Item No.__________(34) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

9. Hiram (continued--Track D, item 34)

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

10. Hildebrand

Track__________(C) Item No.__________(28) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

11. Hibernia

Track__________(B) Item No.__________(29) Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track__________ Item No.__________ Time__________

Track dialed__________

Item No. dialed__________

Time required prior to pushing search button__________

Player function correctly?__________

Comments:____

12. Hinduism, Sec. 1, Beliefs of Hinduism

Track __________(D) Item No. __________(15) Time __________

Track __________ Item No. __________ Time __________

Track __________ Item No. __________ Time __________

Track __________ Item No. __________ Time __________

Track dialed __________

Item No. dialed __________

Time required prior to pushing search button __________

Player function correctly? __________

Comments: ____

General Observations:

STUDY V

MEDIA COMPAIRSON STUDY OF DICTIONARY USE

June E. Morris, Deborah G. Hill,
and Margaret R. MacDougall

Abstract

The purposes of this study were to determine the feasibility of use of recorded dictionary materials for intermediate level visually handicapped students and to compare use of written and recorded dictionary materials by these students in terms of accuracy and time. Written materials were in braille and large type. Recorded materials were recorded on audio cassettes and vocally indexed. Subjects included 16 legally blind students from grades six and seven. After training in use of the recorded materials, subjects were able to locate 88% of the test items in the recorded material in an average time of 136 seconds per item. This compared with 96% accuracy and an average per item time of 45 seconds when using the more familiar written materials. Although these differences favor use of the written materials, results indicate it is feasible for visually handicapped students to use recorded materials of this type.

STUDY V

MEDIA COMPARISON STUDY OF DICTIONARY USE

A number of problems exist for a blind person wishing to consult a dictionary. The two most overwhelming are the cost and the sheer bulk of these publications in both braille and large type. For example, in braille, Webster's New World Dictionary of the American Language, Second College Edition (Guarlnik, 1970), costs $460.80 and requires 72 volumes while its large type counterpart costs $399.60 and requires 24 volumes. Obviously, the cost and storage problems of these publications would discourage individual ownership. Consequently, such reference materials are normally found only in facilities such as libraries, classrooms, and materials repositories.

These problems are not new and have been recognized for a long time. One possible way of alleviating them is the use of recordings for such materials. These would be cheaper and more compact and could be used by both braille and large type readers. A study was conducted (Nolan & Morris, 1974), using the American Printing House's Aural Study System, a disc system that is described by Morris, Nolan, and Phelps (1973), to detemine the usefulness of recorded reference materials for the visually handicapped. Conclusions of this study were:

> Comparison of the efficiency of use of recorded references with the efficiency of use of their braille and large type counterparts showed few differences of practical significance. Other factors such as more generalized usefulness, lower cost, and vast reduction of required storage space strongly support the development of recorded references. (p. 13)

Consequently, the use of recordings appears feasible and the use of audio cassettes has come under consideration as a possible alternate to the use of discs. A dictionary in this form would have strong appeal since special record players would not be necessary for its use.

The purposes of this study were to determine the usefulness of recorded dictionary materials for intermediate level visually handicapped students and to compare use of written and recorded dictionary materials when the written material was in braille or large type and the recorded materials was recorded on audio cassettes and vocally indexed. Comparisons were made in terms of time and accuracy.

Method

Subjects

All subjects in this study were legally blind students assigned to either the sixth or seventh grade. Each was reading at within a year of his assigned grade level. Of the 16 subjects who participated, 8 used braille and 8 used large type. All had used their current reading medium for a minimum of 1 year.

Subjects were selected randomly from those available and eligible at the Georgia Academy for the Blind, the Michigan School for the Blind, and the Ohio State School for the Blind with 9, 3, and 4 coming from the three schools, respectively. All subjects used in the study had to qualify on an alphabetical screening test to insure that each knew how to alphabetize words--and essential criterion for dictionary use.

Materials

Alphabetical screening test. The alphabetical screening test used contained 10 three-choice, multiple-choice items. It is shown in Study No. III. The task for the students was to determine the pair of words between which the word in the question would occur alphabetically. In the first two test items, the second letter was the critical one; in the third and fourth items, the third letter was; in the fifth and sixth, the fourth letter; in the seventh and eight, the fifth letter; and in the ninth and tenth, the sixth letter. All words appearing in the test, questions and answer choices, were selected from the B section of the Thorndike-Barnhart Junior Dictionary (Thorndike & Barnhart, 1959a). The test was provided in braille and large type with the braille test being spelled out in grade one braille.

Dictionary. The Thorndike-Barnhart Junior Dictionary (Thorndike & Barnhart, 1959a) was selected for use in this study because comparable editions were available in braille (Thorndike & Barnhart, 1959b) and large type (Thorndike & Barnhart, 1959c). Additionally, a 120-minute recorded selection from it was available having been used in previous research (Nolan & Morris, 1974). The recording was made by a professional reader in the Talking Book studios of the American Printing House for the Blind and contained 298 items ranging from the letter A through the word admit. Prior to being recorded, the text material was edited to make the content identical to the braille edition. The editing task included indicating which words to spell (all entry items themselves as well as all other tenses or forms of the item and all important words within definitions) and the deletion of page numbers, guide words, pronunciation guides, and graphics. Most captions were deleted also; however, where information was included, these were integrated into the test. In one case, a description was written for information appearing in a graphic and this was inserted into the text. For use in this study, the previously recorded selection was reproduced on a four-track, C-60 cassette at 1 7/8 inches per second (ips). An index, containing 76 items (25.5% of the total number in the selection), was designed with the goal being to index as many items as possible. The index was recorded by the same reader as the content and consisted of the pronunciation of the words followed by the spelling out of the first part of each. The letters given ranged from one through eight. These letters were determined to be "key letters" necessary for locating a word alphabetically. For example, the key letters for the word acorn were aco as acorn was the first word in this dictionary for which the first three letters were aco. The index was reproduced at 30 ips, the approximate rate of the fast forward mode, and superimposed on the same track as the content as is described in another section of this report (Study No. VI). Previous research (Nolan, Foulke, Davis, & Murr, 1976) indicated this type of vocal indexing would be appropriate for use. As the index was recorded at a much faster rate than the content (16:1 ratio), when the content was played it was reproduced at such a low frequency as to be nearly inaudible. Conversely, when the index was heard in the fast forward mode, the content was only heard as a high-pitched background noise. Index information was calibrated with the content so that as soon as an index cue was heard, the same word would be coming up in the content. To hear the content a user had only to release the fast forward button and push play.

The Thorndike-Barnhart Junior Dictionary was written for use by students in grades four through six. As this study was designed to compare use of a dictionary by sixth and seventh grade visually handicapped students when the dictionary was presented in different modes, it was felt that this would be an appropriate dictionary to use.

Recorders. Four-track, APH-Modified GE M8355A Cassette Recorders were used in this study. This model, both two-track and four-track, was designed especially for the visually handicapped and has been in common use for some years. One of its special features is a design modification through which the tape is in contact with the playback head at all times. This feature makes possible both tone and vocal indexing. Another of its useful special features is a variable speed capability which enables a user to increase the set speed by 40% or decrease it by 30%.

Training program. A training program, modeled after one successfully used in previous research (Nolan & Morris, 1974), was designed for individual use with each subject. The program included detailed instructions and specific activities for three training sessions. These included:

Session One: Introduction

Brief review of study and what would be required of participants

Verification of student's availability

Student's informed consent to participate

Administration of alphabetical screening test

Review of rules for alphabetizing

Statement of behavioral objectives

Review of dictionaries as reference works

Activities to familiarize subjects with the recorder and the indexing dictionary cassette

Practice, if time permits

Session Two: Practice

Session Three: Practice (timed)

All training activities were designed to be conducted using side one of the cassette.

Tests. Two eight-item tests, A and B, were developed. They contained adjacent entry words to make them similar in difficulty. The tests were constructed so that half (four) of the items on each alpabetically preceded items on the other and so that the other half (four) of the items alphabetically followed items on the other test. All items on tests A and B were found on side two of the recorded selection from the dictionary. The test tasks were for the subjects to locate the items in either the recorded or written edition of the dictionary. Each task for each subject was scored for time and accuracy. One test was administered during a fourth session and the other during a fifth session.

Subject data record forms. Individual record forms were provided for use with each subject (see Appendix A). These made possible a complete record of each subject's performance throughout the training and test sessions. The data record forms provided, in addition to detailed information for use in all aspects noted under the training program, an itemized listing of the starting setup for each session. The record forms were designed to structure training by serving as an itemized checklist to insure that each subject was thoroughly trained and to be used to record test performance.

Track index cards. In order for a subject to know where to look for a sought item, it was necessary for him to know the range of items recorded on each track. Therefore, track index cards were provided in braille (grade two) and large type showing the first and last items recorded on each track. During the practice sessions these were for tracks 1 and 3 (side one) and during the test session in which the recorded dictionary material was used they were for tracks 2 and 4 (side two).

Cue cards. Braille and large type cue cards were prepared for all entry words to be located during the training and test sessions. These cards were used to provide the correct spelling of words to be located. The braille cards were prepared in standard grade two braille which is how entry words appear in braille dictionaries. As the cue cards were given to the subjects, the subjects were instructed to find _______, with the item being pronounced by the examiner. This provided subjects with the correct pronunciation as well as the spelling.

Procedure

All subjects from the three schools who were eligible and who qualified on the alphabetical screening test by correctly alphabetizing a minimum of 8 of the 10 items were run as subjects. This resulted in two subjects more than called for by the experimental design. Therefore, it was necessary to eliminate data on two; one each from the two categories in which the overtesting had occurred. These were eliminated randomly.

Each subject was scheduled to work individually with an experimenter for five sessions of approximately 40 minutes each. Generally, these were for one class period on each of 5 consecutive school days. The training procedure used was as set forth in the subject data record forms. Administration of tests A and B was counterbalanced between mediums and between the order of the mediums so that there were four test conditions as follows:

A recorded, first--B written, second

B recorded, first--A written, second

A written, first--B recorded, second

B written, first--A recorded, second

Two braille and two large type subjects were assigned to each of the four test conditions by a stratified random means.

A time limit of 5 minutes was imposed on all test tasks so that each subject would have an opportunity to attempt each test item.

Prior to conducting the study, two pilot subjects from the Kentucky School for the Blind were run to checkout the procedure and materials. Subsequently, a few minor changes were made in the subject data record forms.

Results

This study was designed so that data could be analyzed through use of analyses of variance for mixed designs (split-plot) with equal ns. Between subject variables in this 2 x 2 x 2 x 2 design were: reading type (braille vs. large type), test order (A/B vs. B/A), and medium order (recorded/written vs. written/recorded). Medium (recorded vs. written) was the within subject variable. Separate analyses were run for time and accuracy scores and are reported in Tables 1 and 2, respectively.

Of primary importance to the purpose of the study were the two findings that subjects used the written editions of the dictionary significantly faster (.01 level) and significantly more accurately (.05 level) than the recorded version. Reference to the means reported for the main effects in Table 3 shows the magnitude of these differences.

Other significant findings were that subjects using braille worked more accurately (.05 level) than those using large type; and that an interaction occurred (.05 level) in the time required to locate items between reading type, medium, and medium order. This latter was caused by the fact that large type subjects used both the recorded and written test materials more rapidly when they used the written test material prior to using the recorded materials, as did braille subjects when using written materials. However, the converse was true of braille subjects using the recorded material. These persons used the recorded material more rapidly when they were tested with it prior to being tested with the written material.

To take a closer look at the differences found in use of the recorded and written dictionary materials, average location times were computed for braille and large type subjects and their combined total (N = 16) for just those items that were located correctly within the time limits. These are reported in Table 4. These means are somewhat lower than those reported in Table 3 because those in Table 3 were computed using scores of 300 seconds (maximum time allowed for locating each item) in all instances where the

Table 1

Analysis of Variance for Time Scores

Source of variation	df	SS	MS	F
Total	31	112,554.63		
Between subjects	15	17,667.57		
Reading type (RT)	1	874.25	874.25	.90
Test order (TO)	1	746.33	746.33	.77
Medium order (MO)	1	2,737.63	2,737.63	2.83
RT x TO	1	1,049.05	1,049.05	1.08
RT x MO	1	3,224.45	3,224.45	3.33
TO x MO	1	1,293.62	1,293.62	1.34
RT x TO x MO	1	2.68	2.68	.00
Error	8	7,739.57	967.45	
Within subjects	16	94,887.06		
Medium (M)	1	82,698.38	82,698.38	160.51**
RT x M	1	625.52	625.52	1.21
TO x M	1	1,401.32	1,401.32	2.72
MO x M	1	158.78	158.78	.31
RT x TO x M	1	1,035.12	1,035.12	2.01
RT x MO x M	1	2,729.13	2,729.13	5.30*
TO x MO x M	1	2,092.40	2,092.40	4.06
RT x TO x MO x M	1	24.57	24.57	.05
Error	8	4,121.84	515.23	

* $p < .05$

** $p < .01$

Table 2

Analysis of Variance for Accuracy Scores

Source of variation	df	SS	MS	F
Total	31	31.219		
Between subjects	15	18.719		
Reading type (RT)	1	5.281	5.281	5.83*
Test Order (TO)	1	.281	.281	.31
Medium order (MO)	1	.031	.031	.03
RT x TO	1	1.531	1.531	1.69
RT x MO	1	2.531	2.531	2.79
TO x MO	1	1.531	1.531	1.69
RT x TO x MO	1	.281	.281	.31
Error	8	7.250	.906	
Within subjects	16	12.500		
Medium (M)	1	3.781	3.781	5.76*
RT x M	1	.281	.281	.43
TO x M	1	.031	.031	.05
MO x M	1	.031	.031	.05
RT x TO x M	1	.781	.781	1.19
RT x MO x M	1	1.531	1.531	2.33
TO x MO x M	1	.781	.781	1.19
RT x TO x MO x M	1	.031	.031	.05
Error	8	5.250	.656	

* $p < .05$

correct items were not found within the time limits. As can be seen from Table 4, it took subjects three times longer to locate items in the recorded material than in the written. It is also interesting to note that braille and large type subjects used the written materials at approximately the same rate.

Table 3

Means and Standard Deviations for Main Effects

	Time (seconds)		Accuracy	
	M	SD	M	SD
Reading type				
Large type	110.8	61.5	6.9	1.2
Braille	100.4	60.6	7.8	0.6
Test order				
A/B	100.8	53.0	7.4	0.7
B/A	110.4	68.1	7.2	1.2
Medium order				
R/W	114.8	60.7	7.3	1.2
W/R	96.3	60.4	7.4	0.7
Medium				
Recorded	156.4	38.0	7.0	1.3
Written	54.8	23.4	7.7	0.5

Table 4

Average Location Times for Items Located Correctly within Time Limits

	Braille	Large type	Total
Recorded	146.0	124.3	135.9
Written	45.1	44.4	44.8
Total	93.9	81.8	88.2

Note. Time in seconds

Table 5 reports the percentage of items located correctly by braille and large type subjects for both media along with their totals (*N* = 16). Here it can be seen that braille subjects worked more accurately by 10% than did their large type peers. Even so, accuracy for the total group was quite high, 92%.

Table 5

Percentage of Items Located Correctly

	Braille	Large type	Total
Recorded	94	81	88
Written	100	92	96
Total	97	87	92

Discussion

Several important findings resulted from this study. Of greatest practical importance is the fact that it provides empirical evidence that blind students in grades six and seven can use dictionary materials, when recorded on audio cassettes, to locate entry items in that dictionary with reasonable accuracy (88%) and, practically speaking, within a reasonable amount of time (average of 2 1/4 minutes per item).

This study differed from the earlier study of recorded reference materials (Nolan & Morris, 1974) in a number of respects. First, it employed a cassette system rather than a disc system. Although data from this study can not be compared directly with those from the earlier study, it should be noted that about 1/4 minute more time was required to locate each recorded item than with the disc system. This finding was to be expected since cassettes are linear by nature and, therefore, not as efficient to search as discs which are nonlinear. Another respect in which this study differed from the earlier study was that no written indexes were used with the current study, only cards showing "guide words" for each track. This is a definite advantage for persons who are poor readers as it minimizes the role of reading. Probably the greatest practical advantage of the cassette dictionary system tried out in the current study over the previous disc system is that no special equipment is required for its use. But rather, the recorded dictionary can be played on cassette players in common use by visually handicapped persons.

Accuracy of location was well within the acceptable range for braille students, being 94%. However, this was not the case for the large type students who only located 81% of the items correctly when using the recorded material. In both cases, accuracy was higher, 100% and 92% respectively, when written materials were used. This probably reflects the students greater experience with these materials.

Findings from the earlier disc study, in which subjects were taken from grades four through twelve, were that subjects used reference materials significantly more rapidly and accurately as they advanced through the grades. In all probability this finding would also apply to cassette materials, from which it could be inferred that users from higher grade levels would be able to use these materials more rapidly and with an acceptable degree of accuracy.

C-60 cassettes were selected for use in this study rather than the longer C-90s or C-120s because they are more efficient to use. This is because tape systems are linear and the longer the tape, the greater the time required to run it through the system--as in looking for a word.

In the future such material probably would be recorded at 15/16 ips. This speed was not used in the current study because it would not have been possible to slow the index material sufficiently with the recorder used. However, newer equipment, now on the market, would make use of the 15/16 ips speed both feasible and desirable as it will double the amount that can be contained on each cassette (i.e., 4 hours on a four-track, C-60 cassette).

A companion study to the one described here has been conducted and is reported as Study No. VI in this report. In this study results showed that, while potential consumers could find dictionary items readily in either of two possible formats, preference for a recorded dictionary as compared to preference for a written dictionary was not high.

Results of the two studies offer conclusive proof that recorded dictionary materials can be made and can be used. However, a question remains as to their acceptability and, therefore, their potential market. Prior to any final decision on production of a recorded dictionary, considerably more information is needed on this most important topic.

References

Guralnik, D. B. (Ed.). Webster's new world dictionary of the American language (2nd college ed.). New York: World, 1970.

Morris, J. E., Nolan, C. Y., & Phelps. R. G. Aural study systems for the visually handicapped: Field Trial of the Aural Study System: Interim progress report no. 10 [Project No. 8-0046; Grant No. OEG-0-8-080046-2670(032)]. Louisville, Ky.: American Printing House for the Blind, 1973. (ERIC Document Reproduction Service No. ED 078 620)

Nolan, C. Y., Foulke, E., Davis, K., & Murr, M. J. Comparison of three vocal indexes for tape recordings. In C. Y. Nolan (ed.), Facilitating education of the visually handicapped through research in communications: Part two, indexes for tape recordings: Final report (Grant No. OEG-0-73-0642). Louisville, Ky.: American Printing House for the Blind, 1976.

Nolan, C. Y., & Morris, J. E. Program for facilitating the education of the visually handicapped through research in communications: The American Printing House Aural Study System as a reference source: Interim progress report no. 1 (Project No. 23 3492; Grant No. OEG-0-73-0642). Louisville, Ky.: American Printing House for the Blind, 1974.

Thorndike, E. L., & Barnhart, C. L. Thorndike-Barnhart junior dictionary. Chicago; Scott, Foresman, 1959. (a)

Thorndike, E. L., & Barnhart, C. L. Thorndike-Barnhart junior dictionary. Vol. 1 A--artless. (Braille ed.). Chicago: Scott, Foresman, 1959. [Embossed and printed by permission of the publisher by--Louisville, Ky.: American Printing House for the Blind, 1961.] (b)

Thorndike, E. L., & Barnhart, C. L. Thorndike-Barnhart junior dictionary. Vol. 2. A--bra. (Large type ed.). Chicago: Scott, Foresman, 1959. [Large type edition published by permission of the publisher by--Louisville, Ky.: American Printing House for the Blind, 1962.] (c)

APPENDIX

APPENDIX A

MEDIA COMPAIRSON STUDY--SUBJECT DATA RECORD

MEDIA COMPARISON STUDY--SUBJECT DATA RECORD

Name ____________________ Sex __________ School ______________

Grade ______ Reading Level ______________ Experimenter ______________

Week of ____________________ Schedule ______________

Reading Medium ____________________ Number of Years Using ______________

If Braille, Any Useful Vision? ____________________

Has Subject Ever Used A Dictionary? ____________________

DAILY RECORD

Session One

Number correct on alphabetical screening device:

Number of practice items attempted:

Use of recorder:

Understanding of indexing system:

Other:

Session Two

Number of practice items attempted:

Use of recorder:

Understanding of indexing system:

Other:

Session Three

Number of practice items attempted:

Use of recorder:

Understanding of indexing system:

Other:

Session Four

Number of test items completed correctly (recorded/large type/braille):

Any problems:

Other:

Session Five

Number of test items completed correctly (recorded/large type/braille):

Any problems:

Other:

General Observations

MEDIA COMPARISON STUDY--STARTING SETUPS FOR EACH SESSION

All sessions

all equipment and materials should be placed on a table providing ample space

two chairs--one for the subject and one for the experimenter

as good lighting as possible in the testing environment

a room with as little additional noise and distractions as possible

experimenter will need practice cue cards for use during sessions 1-3

experimenter will need subject data records, pencils, and a stopwatch for use during sessions 3-5

experimenter will need test cue cards for use during sessions 4 and 5

Session 1

table space in front of subject clear, initially

alphabetical screening task, in appropriate medium, and crayons

a four-track, APH-Modified GE M8355A Cassette Recorder setup for use, but away from subject, initially

plugged into an electrical outlet

cassette in recorder, side 1 up

written index for tracks 1 and 3 on the table to the left of the recorder

cassette door shut

track switch--set on track 1

volume--set at 3 (middle range)

tone--set at 5 (midway between treble and bass)

speed--set at 1 7/8 ips

variable speed--set at 0 (off)

all buttons--out (not engaged)

Sessions 2 and 3

recorder and materials on table in front of subject setup for use as described for Session 1

practice items continued on side 1, tracks 1 and 3

Sessions 4 and 5

If recorded dictionary to be used for test:

recorder on table in front of subject setup as for Sessions 1, 2, and 3, except that the cassette should be wound ready to play side 2, and placed in the recorder with side 2 up and with the written index for tracks 2 and 4 to the left of the recorder. The track switch should be set on track 4.

If written dictionary to be used for test:

braille or large type volume on table in front of subject, closed

Session 1

Introduce self; then, briefly tell the potential subject that you are going to be having some of the students at his/her school help you by learning how to use a new kind of recorded dictionary. Explain that those students who participate will spend approximately one class period (about 40 minutes--to be scheduled by the school) working with you--today and for the next 4 days during which time they will learn how to find items in a cassette dictionary. Then ask the student if he/she would be willing to take part.

_____YES _____NO

If the student seems reluctant or is not willing to participate, don't pressure.

Dismiss him/her politely.

If the student is willing, check with him/her to verify that he/she will be available for the next 4 days and has no insurmountable scheduling problems.

Administering "Alphabetical Screening Task"

Explain to the student that in order to use the cassette dictionary efficiently it is necessary that he/she be able to alphabetize words. Show the student the alphabetical screening device. Then ask him/her to please read the instructions and complete the task. Clarify instructions if necessary.

if fail--thank, but dismiss (more than one item missed)

if pass--continue, as follows (9 or 10 items correctly alphabetized)

REVIEW RULES FOR ALPHABETIZING (go over any question on screening task that the student missed or any particular questions of subject.)

A. Letter by letter alphabetizing is used in Thorndike-Barnhart Junior Dictionary

1. If first letters are the same, go to second letters; etc.
   e.g., baby - body; babble - baby

2. If all letters of one word are used in the letter by letter alphabetizing and the second word has more letters, then the first word precedes the second one
   e.g., band - bandage

3. Rule 2 above applies also to abbreviations and/or initials
   e.g., A.B. follows a and precedes abacus

Then say:

DURING THIS WEEK YOU ARE GOING TO LEARN HOW TO USE A FOUR-TRACK, CASSETTE RECORDER TO FIND ITEMS IN A RECORDED DICTIONARY. BY THE END OF THE WEEK YOU WILL BE ABLE TO LOCATE SUCH ITEMS WITHOUT HELP FROM ME. DO YOU HAVE ANY QUESTIONS?

Session 1

Review of Reference Materials

Uses of an English language dictionary: (Ask the subject the purposes for which he has used a dictionary. ____.
Then discuss those listed below. Those marked with an asterisk are included in the Thorndike-Barnhart Junior Dictionary. Other uses listed are possible with other dictionaries, however, not necessarily all of them with all other dictionaries.

*Meaning of words
    Various meanings listed under separate numbers
    Proper use shown by examples from recognized writers
*Correct spelling
*Correct pronunciation (syllables, accent marks, diacritics)
*Syllables--showing where a word may be divided at the end of a line
*Part of speech
*Other forms of the word
*Abbreviations
*Prefixes and suffixes
*Illustrations--not in recorded or braille (incorporated)
Etymologies--derivation of the word from other words
Synonyms--exact meaning of synonyms may be given
Reference to other words with related meaning
Comparison with other related meaning
Antonyms--words with opposite meanings
Americanizations
Slang meanings
If the word is obsolete
Whether a verb is transitive or intransitive--transitive verbs take
    direct objects, intransitive ones do not (e.g., He disapproves.)

Session 1

Activities to Familiarize Subjects with the Recorder and Indexed Dictionary Cassette

NOTE: Desired terminal behaviors have been underlined.

I. Familiarization to the cassette recorder

"The subject should be able to . . ."

A. List verbally the features that are located on the top deck.

1. Examine the top deck and name the features or controls with which you are already familiar.

2. Discuss location of the cassette door, holder, cassette eject switch, volume control, tone control, speed switch, variable speed control, track switch, and index button.

3. Discuss the shape of each feature and its position relative to sides of the top deck.

4. Name the features discussed in A-2.

B. List verbally the push button controls.

1. Discuss the location of the record button (no mark), rewind button (<), fast forward button (>), play button (0), pause button (|), and stop button (X).

2. Discuss the use of each, how each is engaged and disengaged, and each button's position relative to the others.

3. Name the features discussed in B-1.

C. Describe each control in respect to its shape and its operation.

1. What is the shape of the cassette door and holder? cassette eject button?

2. What is the shape of the volume, tone, and variable speed controls?

3. What is the shape of the speed switch? the track switch?

4. What is the shape of the index button?

5. What is the shape of the record, rewind, fast forward, play, pause, and stop buttons?

6. Activate each control especially noting the various movements required.

7. Demonstrate the range possible using the variable speed control.

8. Demonstrate engaging and disengaging the push buttons. (NOTE: Fast forward must be fully depressed to hear indexing.) Have subject listen to play and fast forward.

9. Touch any feature or control of the recorder upon command.

II. Familiarization to the dictionary cassette

"The experimenter should tell the subject . . ."

A. The cassette is a 120-minute selection recorded on a four-track, C-60 cassette.

  1. Subject should examine the cassette tactually.

B. The cassette is made up of two parts.

  1. Content
  --entry words in dictionary

  2. Index words
  --cue word signals that that word is coming next on content track
  --about 1/4 of all entry words are indexed

C. The content and index are heard at different speeds. Both are heard on the same tracks.

  1. Content--1 7/8 ips--each new word introduced by sound signal

  2. Index--30 ips, the approximate speed of fast forward--index words pronounced and first few significant letters given
  (NOTE: Number of key letters varies)

  3. Because the two are heard at different rates, only the one recorded at the rate being played will be heard clearly--index words are heard as a background rumble when the content is being played, and content information is heard as a high-pitched noise when fast forward is engaged and the index words are heard.

D. To place the cassette in the cassette holder

III. Familiarization to the indexing capabilities for the system

"The subject should be able to . . ."

A. Demonstrate how the index track is searched.

1. Search forward using fast forward
    a. Listen to two indexed items
    b. Return to regular track and listen to second
2. Reverse--note sound of index words in reverse
3. Search backwards
    a. Reverse and stop at second unintelligible sound heard
    b. Engage fast forward to learn what item is
    c. Return to regular track and listen to it

B. Demonstrate how nonindexed words are found.

1. Search forward using fast forward
    a. Listen for key letters
    b. Find first word which alphabetically follows the word for which you are searching
2. Reverse using rewind and go back two index words
3. Push play

Sessions 1 and 2

Dictionary Practice Items

Notes to experimenter:

At the start of session two, review the various parts of the recorder and answer any questions the subject may have. Also, review track switch noting positions of tracks 1 and 3.

To locate an item, a subject must hear it pronounced in the content. The subject should be taught to engage the pause as soon as the sought item is found.

When the subject is looking for a nonindexed item, encourage him/her to use the variable speed to speedup the search.

Have all buttons released before initiating search for each new item. Leave card from preceding item available.

I. Practice

A. Use indexing capability of the system

1. Find the item abase. (Give cue card)
(side 1, track 1, 3rd indexed item)

Use recorder
Understand search technique
Locate
Other

B. Use variable speed

(1) Listen to above item at normal rate

(2) Listen to the same item again, this time at a fast rate

C. Use index and content of the system in a coordinated manner

2. Find the item abdicate. (Give cue card)
(side 1, track 1, 3rd item after abbot--5th indexed item)

Use recorder
Understand search technique
Locate
Other

D. Use track switch

3. Find the item acropolis. (Give cue card)
(side 1, track 3, 18th indexed item)

Use recorder
Understand search technique
Locate
Other

E. Use rewind

4. Find the item ace. (Give cue card)
(side 1, track 3, 2nd item after accustom--8th indexed item)

Use recorder
Understand search technique
Locate
Other

5. Find the item abide. (Give cue card)
(side 1, track 1, 10th indexed item)

    Use recorder
    Understand search technique
    Locate
    Other

6. Find the item abbot. (Give cue card)
(side 1, track 1, 5th indexed item)

    Use recorder
    Understand search technique
    Locate
    Other

7. Find the item ablaze. (Give cue card)
(side 1, track 1, 2nd item after abject--11th indexed item)

    Use recorder
    Understand search technique
    Locate
    Other

8. Find the item abandonment. (Give cue card)
(side 1, track 1, 2nd item after abandon--2nd indexed item)

    Use recorder
    Understand search technique
    Locate
    Other

9. Find the item acid. (Give cue card)
(side 1, track 3, 11th indexed item)

    Use recorder
    Understand search technique
    Locate
    Other

10. Find the item acquire. (Give cue card)
(side 1, track 3, 15th indexed item)

    Use recorder
    Understand search technique
    Locate
    Other

11. Find the item accurate. (Give cue card)
(side 1, track 3, 1st item after accuracy--6th indexed item)

    Use recorder
    Understand search technique
    Locate
    Other

12. Find the item accost. (Give cue card)
(side 1, track 3, 5th after accord--2nd indexed item)

Use recorder
Understand search technique
Locate
Other

13. Find the item able. (Give cue card)
(side 1, track 1, 12th indexed item)

Use recorder
Understand search technique
Locate
Other

14. Find the second entry for the item a. (Give cue card)
(side, 1, track 1, 1st item after A--1st indexed item)

Use recorder
Understand search technique
Locate
Other

15. Find the item ability. (Give cue card)
(side 1, track 1, 2nd item after abide--10th indexed item)

Use recorder
Understand search technique
Locate
Other

16. Find the item acorn. (Give cue card)
(side 1, track 3, 3rd item after acme--13th indexed item)

Use recorder
Understand search technique
Locate
Other

17. Find the item achieve. (Give cue card)
(side 1, track 3, 10th indexed item)

Use recorder
Understand search technique
Locate
Other

18. Find the item acme. (Give cue card)
(side 1, track 3, 13th indexed item)

Use recorder
Understand search technique
Locate
Other

19. Find the item A.B. (Give cue card)
(side 1, track 1, 4th item after A--1st indexed item)

Use recorder
Understand search technique
Locate
Other

20. Find the item abroad. (Give cue card)
(side 1, track 1, 20th indexed item)

Use recorder
Understand search technique
Locate
Other

21. Find the item aboard. (Give cue card)
(side 1, track 1, 14th indexed item)

Use recorder
Understand search technique
Locate
Other

22. Find the item accomplish. (Give cue card)
(side 1, track 3, 1st indexed item)

Use recorder
Understand search technique
Locate
Other

23. Find the item acre. (Give cue card)
(side 1, track 3, 2nd item after acquit--16th indexed item)

Use recorder
Understand search technique
Locate
Other

24. Find the item ache. (Give cue card)
(side 1, track 3, 3rd item after acetate--9th indexed item)

Use recorder
Understand search technique
Locate
Other

25. Find the item abeam. (Give cue card)
(side 1, track 1, 7th indexed item)

Use recorder
Understand search technique
Locate
Other

26. Find the item about. (Give cue card)
(side 1, track 1, 1st item after abound--17th indexed item)

Use recorder
Understand search technique
Locate
Other

27. Find the item abracadabra. (Give cue card)
(side 1, track 1, 18th indexed item)

Use recorder
Understand search technique
Locate
Other

28. Find the item accuracy. (Give cue card)
(side 1, track 3, 6th indexed item)

Use recorder
Understand search technique
Locate
Other

29. Find the item across. (Give cue card)
(side 1, track 3, 1st item after acropolis--18th indexed item)

Use recorder
Understand search technique
Locate
Other

30. Find the item account. (Give cue card)
(side 1, track 3, 3rd indexed item)

Use recorder
Understand search technique
Locate
Other

Session 3

Timing Dictionary Practice Items

Notes to experimenter:

Review anything which the subject doesn't seem to understand.

Tell the subject that today you will be timing him/her. Start timing when cue card is given; stop when the pause is engaged.

Have all buttons released before initiating search for each new item. Leave card from preceding item available.

Practice

1. Find the item abet. (Give cue card)
(side 1, track 1, 8th indexed item)

    Use recorder
    Understand search technique
    Locate
    Time to locate
    Other

2. Find the item abandon. (Give cue card)
(side 1, track 1, 2nd indexed item)

    Use recorder
    Understand search technique
    Locate
    Time to locate
    Other

3. Find the item able-bodied. (Give cue card)
(side 1, track 1, 2nd item after able--12th indexed item)

    Use recorder
    Understand search technique
    Locate
    Time to locate
    Other

4. Find the item acrid. (Give cue card)
(side 1, track 3, 17th indexed item)

    Use recorder
    Understand search technique
    Locate
    Time to locate
    Other

5. Find the item acetylene. (Give cue card)
(side 1, track 3, 2nd item after acetate--9th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

6. Find the item abode. (Give cue card)
(side 1, track 1, 1st item after aboard--14th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

7. Find the item aboriginal. (Give cue card)
(side 1, track 1, 16th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

8. Find the item accustom. (Give cue card)
(side 1, track 3, 8th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

9. Find the item acknowledge. (Give cue card)
(side 1, track 3, 12th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

10. Find the item accordion.
(side 1, track 3, 4th item after accord--2nd indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

11. Find the item accrue. (Give cue card)
(side 1, track 3, 1st item after accredit--5th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

12. Find the item abound. (Give cue card)
(side 1, track 1, 17th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

13. Find the item ablution. (Give cue card)
(side 1, track 1, 13th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

14. Find the item abridge. (Give cue card)
(side 1, track 1, 1st item after abreast--19th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

15. Find the item accord. (Give cue card)
(side 1, track 3, 2nd indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

16. Find the item accountant. (Give cue card)
(side 1, track 3, 2nd item after account--3rd indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

17. Find the item acrobat. (Give cue card)
(side 1, track 3, 3rd item after acrid--17th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

18. Find the item accouter. (Give cue card)
(side 1, track 3, 4th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

19. Find the item Aaron. (Give cue card)
(side 1, track 1, 3rd item after A--1st indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

20. Find the item abbey. (Give cue card)
(side 1, track 1, 2nd item after abbe'--4th indexed item)

Use recorder
Understand search technique
Locate
Time to locate
Other

Session 4 or 5

Dictionary Test A

Medium: written (braille/large type) or recorded

Notes to the experimenter:

Start timing as soon as cue card is given to the subject. When using the written edition, stop timing when subject reports he/she has found the item. When using the recorded edition, stop timing when the subject engages the pause. Maximum time permitted per task--5 minutes.

Regarding the correctness of a response, when using the written edition, after the subject says he/she has found the item, ask him/her to show it to you by pointing to it. When using the recorded edition, the correct word must be heard in the content to be scored as correct. Subjects may not be sure they have found the right word until they hear it spelled.

Search for the first item should start with the book closed or the cassette wound ready to play from the beginning of the side. Search for subsequent items will continue, in both the book and the cassette, from the correct location of the preceding item. If the subject has not correctly located the preceding item, then the experimenter should flip to the correct page in the book or find the correct item on the cassette. This is essential in order that the timing be constant for all items. All buttons should be released prior to initiating search for each new item. Leave card from preceding item available.

Say to the subject: I AM GOING TO ASK YOU TO LOOK UP SOME WORDS IN THE (WRITTEN) (RECORDED) EDITION OF THE DICTIONARY. For subjects using the written edition, say: TELL ME AS SOON AS YOU HAVE FOUND THE WORD, THEN SHOW ME THE WORD BY POINTING TO IT. For subjects using the recorded edition, say: AS SOON AS YOU HAVE FOUND THE WORD IN THE CONTENT, STOP THE RECORDER BY PUSHING THE PAUSE BUTTON. FIRST, LOOK AT THE TRACK SWITCH.(review positions of tracks 2 and 4.) Begin testing with track switch set on 4.

1. Find the word adjutant. (Give cue card)

    Written: Braille page 52; large type page 96
    Recorded: Side 2, track 2, 3rd item after adjust--17th indexed item

    Time to locate________________________________

    Correct item found______________________________

2. Find the word accede. (Give cue card)

Written: Braille page 20; large type page 74
Recorded: Side 2, track 4, 4th item after academic--9th indexed item

Time to locate ______________________________

Correct item found ___________________________

3. Find the word abrupt. (Give cue card)

Written: Braille page 13; large type page 69
Recorded: Side 2, track 4, 1st indexed item

Time to locate ______________________________

Correct item found ___________________________

4. Find the word Adams. (Give cue card)

Written: Braille page 45; large type page 91
Recorded: Side 2, track 2, 6th indexed item

Time to locate ______________________________

Correct item found ___________________________

5. Find the word address. (Give cue card)

Written: Braille page 47; large type page 93
Recorded: Side 2, track 2, 1st item after addle--10th indexed item

Time to locate ______________________________

Correct item found ___________________________

6. Find the word absorb. (Give cue card)

Written: Braille page 15; large type page 70
Recorded: Side 2, track 4, 4th indexed item

Time to locate ______________________________

Correct item found ___________________________

7. Find the word adieu. (Give cue card)

Written: Braille page 49; large type page 94
Recorded: Side 2, track 2, 13th indexed item

Time to locate______________________________________

Correct item found__________________________________

8. Find the word acclamation. (Give cue card)

Written: Braille page 24; large type page 77
Recorded: Side 2, track 4, 1st item after acclaim--15th indexed item

Time to locate______________________________________

Correct item found__________________________________

Session 4 or 5

Dictionary Test B

Medium: written (braille/large type) or recorded

Notes to the experimenter:

Start timing as soon as cue card is given to the subject. When using the written edition, stop timing when subject reports he/she has found the item. When using the recorded edition, stop timing when the subject engages the pause. Maximum time permitted per task--5 minutes.

Regarding the correctness of a response, when using the written edition, after the subject says he/she has found the item, ask him/her to show it to you by pointing to it. When using the recorded edition, the correct word must be heard in the content to be scored as correct. Subjects may not be sure they have found the right word until they hear it spelled.

Search for the first item should start with the book closed or the cassette wound ready to play from the beginning of the side. Search for subsequent items will continue, in both the book and the cassette, from the correct location of the preceding item. If the subject has not correctly located the preceding item, then the experimenter should flip to the correct page in the book or find the correct item on the cassette. This is essential in order that the timing be constant for all items. All buttons should be released prior to initiating search for each new item. Leave card from preceding item availalbe.

Say to the subject: I AM GOING TO ASK YOU TO LOOK UP SOME WORDS IN THE (WRITTEN) (RECORDED) EDITION OF THE DICTIONARY. For subjects using the written edition, say: TELL ME AS SOON AS YOU HAVE FOUND THE WORD, THEN SHOW ME THE WORD BY POINTING TO IT. For subjects using the recorded edition, say: AS SOON AS YOU HAVE FOUND THE WORD IN THE CONTENT, STOP THE RECORDER BY PUSHING THE PAUSE BUTTON. FIRST, LOOK AT THE TRACK SWITCH. (review positions of tracks 2 and 4.) Begin testing with track switch set on 4.

1. Find the word administer. (Give cue card)

Written: Braille page 52; large type page 96
Recorded: Side 2, track 2, 18th indexed item

Time to locate________________________________

Correct item found____________________________

2. Find the word accelerate. (Give cue card)

Written: Braille page 20; large type page 74
Recorded: Side 2, track 4, 10th indexed item

Time to locate ______________________________

Correct item found ______________________________

3. Find the word Absalom. (Give cue card)

Written: Braille page 13; large type page 69
Recorded: Side 2, track 4, 1st item after abrupt--1st indexed item

Time to locate ______________________________

Correct item found ______________________________

4. Find the word adamantine. (Give cue card)

Written: Braille page 45; large type page 91
Recorded: Side 2, track 2, 4th item after adage--5th indexed item

Time to locate ______________________________

Correct item found ______________________________

5. Find the word addle. (Give cue card)

Written: Braille page 47; large type page 93
Recorded: Side 2, track 2, 10th indexed item

Time to locate ______________________________

Correct item found ______________________________

6. Find the word absolve. (Give cue card)

Written: Braille page 15; large type page 70
Recorded: Side 2, track 4, 3rd item after absolute--3rd indexed item

Time to locate ______________________________

Correct item found ______________________________

7. Find the word adios. (Give cue card)

Written: Braille page 49; large type page 94
Recorded: Side 2, track 2, 1st item after adieu--13th indexed item

Time to locate____________________________________

Correct item found________________________________

8. Find the word acclaim. (Give cue card)

Written: Braille page 24; large type page 77
Recorded: Side 2, track 4, 15th indexed item

Time to locate____________________________________

Correct item found________________________________

Abstract

The purposes of this study were to determine interest of potential consumers in having a recorded dictionary and in obtaining their opinions regarding the best format for such a dictionary. Subjects included 10 mature blind consumers, 10 teachers of high school level blind students (some of whom were blind themselves), and 10 librarians at residential schools for the blind. Two experimental recordings containing a 1-hour selection from the dictionary were used to familiarize subjects with dictionary material in recorded form and to demonstrate two possible formats. Subjects were able to use both formats but preferred (73% to 20%) the one having index information superimposed at a higher speed on the same track with the content over the one having index information on the track running parallel to the content track. Eighty percent of the subjects stated they would prefer to use a written dictionary than a recorded one.

STUDY VI

A CONSUMER REVIEW OF A CASSETTE DICTIONARY

Previous research has indicated that it is possible for blind persons to use recorded reference materials (Studies I and II). Now it is necessary to determine if interest is great enough to warrant production of such and to explore ways in which these might to provided. The goal for such materials is that they be in a form that provides for maximum usefulness. One method being explored is the use of vocally indexed audio cassettes which can be played on regular cassette recorders commonly available to the blind through the American Printing House for the Blind and the Library of Congress' Division for the Blind and Physically Handicapped. This mode has the obvious advantage or requiring no special playback equipment.

The purposes of this study were to elicit responses from groups of potential consumers regarding their needs for dictionaries, their evaluation of the usefulness of a recorded dictionary as compared to a written dictionary, and their ideas regarding questions of format for a recorded dictionary.

In order to accomplish this, a dictionary selection was recorded and then vocally indexed in two different ways that previous research (Nolan, Foulke, Davis, and Murr, 1976) had established could be learned and used by visually handicapped students. The purpose for doing this was twofold: first, to have something to give reviewers with which to acquaint them with recorded dictionary material and, second, to obtain comparative information about the desirability of the two formats used for vocal indexing. In one type of vocal indexing, index cues were recorded and superimposed on the same track with the content; however, at a rate enabling them to be heard intelligibly when the fast forward mode was engaged. In the second type, which utilized four-track cassettes, index cues were recorded on the track parallel to the content track; again at a rate enabling them to be understood when the recorder was operated in the fast forward mode. Both methods are technically feasible, and both have some advantages and some disadvantages over the other.

Overall, the purposes of this study were to determine the interest of potential consumers in having a recorded dictionary and in obtaining their opinions regarding the best format for such a dictionary.

Method

Subjects

Subjects included 30 persons; 10 of whom were mature blind consumers, 10 of whom were teachers of high school level blind students, and 10 of whom were librarians at residential schools for the blind.

Such persons were selected for inclusion in this study because they represent potential consumer groups for a cassette dictionary should it become a reality. All subjects were initially contacted by phone to determine if they were willing and able to participate in the study. Each was paid $50.00 for taking part. Subjects were drawn from throughout the United States as follows: Washington (2), Oregon (2), California (1), Idaho (4), Utah (1), Colorado (1), Nebraska (3), Minnesota (2), Iowa (1), Missouri (2), Wisconsin (2), Kentucky (1), West Virginia (2), Georgia (2), Massachusetts (2), and Virginia (2).

Materials

Demonstration recordings. Two formats for a recorded dictionary were developed and recorded. Both contained the same professionally recorded, 1-hour selection from The American Heritage Dictionary of the English Language (Davies, 1973) which included the section from enthuse through equivalence. It was recorded in the Talking Book Studios of the American Printing House for the Blind, and it included 114 entries of which 59 (52%) were vocally indexed. This represented approximately every other word. Vocal indexing consisted of the pronunciation of the entry word. Where more than one pronunciation was given for an entry word, the preferred was used for the index.

Prior to recording the dictionary content, copy was prepared for recording as follows: All words to be spelled out were indicated by being underlined in red. These included all entry words, other forms of the entry word, and important words within definitions. Pauses were used in the spelling of entry words to indicate syllabication. Other editing included indicating when an entry was an abbreviation and when it contained more than one word (e.g., Epsom salts, two words). Etymologies given in the written edition of the dictionary were deleted as they are not widely used and require considerable additional time to read. Also deleted were graphics, pronunciation guides, guide words, and page numbers. When recorded, all entry words were preceded by a sound cue which served to distinctly identify a new entry word from the definition or other forms of the preceding entry. In addition to editing the text, it was necessary to list the words to be vocally indexed so that these too could be recorded. Both formats of the dictionary used the same index words; however, application differed for the two. These are described as follows:

Index and content on same tracks--The 1-hour selection from the dictionary was reproduced on four-track, C-60 cassettes to demonstrate this index method. Both the content and the index were recorded on tracks 1 and 4 of sides 1 and 2, respectively. [This is the same thing as tracks 1 and 2 of sides 1 and 2, respectively, of a two-track cassette.] The reason for calling them tracks 1 and 4 was so that the same recorder (four-track APH-Modified GE 8355A Cassette Recorder) could be used in the same orientation to review the tapes demonstrating the two dictionary formats. Tracks 1 and 4 were selected for use as a matter of convenience so that the track selection switch of this recorder could be set once, at the 1-4 position, and then not require further manipulation during use of this cassette.

The content was recorded and heard at the regular play rate of 1 7/8 inches per second (ips) which provided for approximately 30 minutes per track. The index was heard when the fast forward mode was engaged as it was recorded at 30 ips, the approximate rate of fast forward. Each index word was positioned so that as soon as it was heard in the fast forward mode, the same entry word would be coming up in the content. Although the tape does not move at a constant rate in the fast forward mode, the index words were thoroughly intelligible throughout the entire length of the tape; however, a user could manipulate the variable speed to adjust this rate if desired. Because the index information was recorded 16 times faster than the content, the index words were heard only as a low background rumble when the content was played because of their low frequency at the 1 7/8 inches rate. Conversely, when the fast forward was engaged, the content was heard only as a high-pitched background chatter. Instructions (see Appendix A) for use of this index method were recorded at the beginning of side 1 of the cassette immediately following the side announcement and permission statement.

Index and content on parallel tracks--As with the other indexing method described, a 1-hour selection from the dictionary was reproduced on four-track, C-60 cassettes to demonstrate this index method. On four-track cassettes, tracks 1 and 3 go in one direction and tracks 2 and 4 in the other. On these cassettes, the content of the dictionary was recorded on tracks 1 and 4 of sides 1 and 2, respectively, at 1 7/8 ips. This provided for approximately 30 minutes on each side. The reason tracks 1 and 4 were used rather than 1 and 2 was so that both tracks could be played with the track switch of the recorder set in the same position. If tracks 1 and 2 had been used, it would have been necessary to reset the track switch each time the side was changed and also a different search technique would be required for the two sides of a cassette--an unnecessary cause for confusion. The index words were recorded on tracks 2 and 3; with those for track 1 on track 3 and those for track 4 on track 2. As with the other dictionary format, the index words were recorded at 30 ips, the approximate rate of fast forward, and were positioned so that as soon as a word was heard in the fast forward mode on the index track it would be coming up on the content track. Thus, when a sought word was heard on the index track, a user only had to switch to the parallel content track and push play to hear the word and its accompanying information at the regular play rate. The index words were thoroughly intelligible throughout the entire length of the tape; however, a user could manipulate the variable speed to adjust this rate if desired. Instructions (see Appendix A) for use of this index method were given at the beginning of side 1 of the cassette immediately following the side announcement and permission statement.

Cassette recorder. A prerequisite for reviewing the tapes demonstrating the two dictionary formats was that the user have access to a four-track APH-Modified GE 3355A Cassette Recorder. This recorder was selected as it had been designed for use by the visually handicapped, making vocal indexing possible, and it had been on the market long enough to be widely in use. The reason it was essential for the subjects to use this recorder when the cassettes could have been played equally well on either the later model of recorder/player distributed by the American Printing House for the Blind or the one distributed by the Library of Congress was that the configuration of this player's track selection switch varies from that of the others. Consequently, the instructions for use of the demonstration cassettes would not have been appropriate for use with either of the other players.

Instructions for use. Identical instructions for use were provided for both formats in recorded and written form. These were recorded at the beginning of the appropriate tape and written out in both braille and large type. One set was specific to the same track index method and the other to the parallel track index method. Copies of both can be found in Appendix A.

Survey form. A three-part survey form was designed to determine needs for dictionaries, to assay opinions regarding the two dictionary formats demonstrated, to get information on other questions of format, and to determine preferences for written or recorded dictionaries. It was printed in braille and large type. Parts 1 and 2 were composed of 13 identical five-choice, multiple-choice questions. Part 1 pertained to the same track format and Part 2 pertained to the parallel track format. Part 3 contained 11 open-ended questions designed to elicit additional information about the vocal indexing methods demonstrated, and to provide other information to be used to determining interest in having a recorded dictionary, and in the preparation of copy should a decision be made to produce an aural dictionary. A copy of the survey form appears in Appendix B.

Procedure

The first step in preparation of the materials was to select a dictionary for use. Initially, a number of dictionaries were reviewed, after which a decision was made to use a paperback edition rather than a more extensive hardback edition. Two paperbacks were selected for further consideration. One was the Webster's New World Dictionary of the American Language (Guralnik, 1973), and the other was The American Heritage Dictionary of the English Language (Davies, 1973). The latter was selected for use in this study because, should the results of the study prove positive and one be chosen for production, this would be the more appropriate as the hardback edition of the Webster's dictionary is available to the visually handicapped in both braille and large type.

Following selection of the dictionary, a portion of it was edited and recorded as described in the Materials section.

The method used by Printing House technicians to achieve vocal indexing on the demonstration tapes was as follows. First, the content was originally recorded at 3 3/4 ips and the index at 15 ips, the maximum rate possible in the American Printing Houses's studios. These original masters were then copied, using two-track heads, on the top half of different tapes, the content at 3 3/4 ips and the index at 30 ips. This latter was achieved by placing the original 15 ips tape on one machine, set at 7 1/2 ips, and copying it on another machine, set at 15 ips. This resulted in doubling the rate meaning that the resulting index tape would be heard normally when played at 30 ips. The next step was to turn content and index tapes over (upside down) and place them on separate two-track machines. In this orientation, when played, the recorded material would be heard backwards. Otherwise, being upside down only resulted in reversal of the tracks. Index words were then positioned and recorded at 60 ips, using the same technique as previously described to double their rate, on the blank half (top half when recorded but bottom half when in the correct orientation) of the tape containing the content. These words were positioned by playing the content backwards until the sound cue for an entry word to be indexed was heard, then backing for approximately 5 seconds more, then recording the index word. When recorded, it was recorded backwards. After this step was completed, the master for the parallel track index was complete. Another step was required for completion of the same track index master. This was to run the content and index through a mixer and record them, in this combined form, on the top half of another tape. When copied, the play rate was halved so that the content was properly heard at 1 7/8 ips and the index at 30 ips on the demonstration tapes.

Two sets of instructions were drafted, one for each of the indexing methods, and reviewed.[1] These were then slightly modified and, as previously stated, printed in both braille and large type as well as being recorded at the beginning of the appropriate tape.

Similarly, the three-part survey form was drafted and submitted for review after which it was printed in braille and large type.

The identification of potential subjects was achieved primarily through referral from known persons working in the area of blindness. These potential subjects were then contacted by phone to determine if they had access to the necessary recorder and if they were interested in participating in the review. All but one person contacted wanted to take part; however, not all had access to the necessary recorder. At the time subjects were positively identified, information was elicited as to each subject's best mailing address and the medium (braille or large type) preferred for the written materials.

All materials needed by the reviewers were mailed via first class mail early in October 1975 with instructions that the survey form be returned by 31 October 1975. These materials included nine items: a cover letter; two cassettes demonstrating the two dictionary formats; two sets of written instructions for use with the cassettes; the three-part survey form; a Plasticolor pencil crayon for use in marking Parts 1 and 2 of the survey form; a blank cassette for use, if desired, in responding to Part 3 of the survey form; and a stamped, self-addressed envelope. At the time a subject's completed survey form was returned, he was sent a check for $50.00 to recompense him for his time and effort.

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[1] Dr. Emerson Foulke, Director of the University of Louisville's Perceptual Alternatives Laboratory, was helpful in reviewing the instructions for use of the two indexing methods described in this study.

Results

One hundred percent of the survey forms were returned. Results from Parts 1 and 2 are presented in Table 1. Part 1 pertained to the same track index format and Part 2 to the parallel track index format.

Table 1

Summary of Results of Parts 1 and 2 of the Survey

Relating Opinions of the Same and Parallel Track Indexes

Question	Answer options	Part 1 same track	Part 2 parallel track
1. Were you able to understand how to use the index to help you find words in the content?	easily	24	21
	pretty well	4	6
	with a little difficulty	2	3
	with a lot of difficulty	0	0
	no	0	0
2. Were you able to perform the operations required for searching for indexed words?	yes	28	24
	pretty well	2	4
	fairly well	0	2
	not too well	0	0
	no	0	0
3. Were you able to perform the operations required for searching for words in the content that were not indexed?	yes	19	20
	pretty well	8	8
	fairly well	2	2
	not too well	1	0
	no	0	0
4. After having had a little practice, could you find the words for which you were looking when they were indexed?	always	28	28
	usually	2	2
	about half the time	0	0
	infrequently	0	0
	never	0	0
5. After having had a little practice, could you find the words for which you were looking when they were in the content, but not indexed?	always	20	20
	usually	9	10
	about half the time	0	0
	infrequently	1	0
	never	0	0

Table 1--continued

Question	Answer options	Part 1 same track	Part 2 parallel track
6. About how long did it usually take you to find an indexed word?	less than 2 minutes	26	26
	2 to 4 minutes	3	4
	4 to 6 minutes	0	0
	6 to 8 minutes	0	0
	over 8 minutes	0	0
7. About how long did it usually take you to find a word in the contnet that was not indexed?	less than 2 minutes	14	18
	2 to 4 minutes	14	8
	4 to 6 minutes	0	4
	6 to 8 minutes	1	0
	over 8 minutes	0	0
8. What was the quality of the recording of the content?	excellent	14	24
	good	13	5
	fair	1	1
	not too good	2	0
	poor	0	0
9. Did you have any difficulty understanding the content?	none	25	27
	just a little	4	2
	some	1	1
	quite a bit	0	0
	a great deal	0	0
10. What was the quality of the recording of the index?	excellent	13	20
	good	11	8
	fair	4	2
	not too good	0	0
	poor	1	0

Table 1--continued

Question	Answer options	Part 1 same track	Part 2 parallel track
11. Did you have any difficulty understanding the index?	none	16	23
	just a little	10	6
	some	3	1
	quite a bit	1	0
	a great deal	0	0
12. Regarding the number of words indexed	many more should have been	2	2
	a few more should have been	6	5
	just about the right number were	19	21
	not quite so many should have been	3	2
	many fewer should have been	0	0
13. Regarding the time allowed on the cassette between hearing a word in the index and hearing the same word in the content	should have been much longer	0	0
	should have been a little longer	2	2
	was just about right	23	25
	should have been a little less	4	2
	should have been much less	0	1

Note. N = 30; however, not all groups add up to 30 because not all responses were quantifiable.

These results reveal several things. In practically all instances 90% or more of the subjects rated the demonstration formats positively. Exceptions were that only 83 % of the subjects rated the quality of the recording of the same track index format positively while 87% rated its understandability positively; and, only 87% of the subjects reported they were able to find nonindexed words in the content on the parallel track format in less than 4 minutes. With the exception of questions 7, 8, 10, and 11, response patterns were quite similar for the questions for Parts 1 and 2. From the pattern of responses on question 8, 10, and 11, it appears that some interference resulted from having both the content and the index on the same track and that this slightly diminished the quality of both, and the understandability of the index. As the input for both the same track and parallel track formats was identical, the resulting difference in rating must have reflected the treatment. From the responses to questions 12 and 13 regarding the number of items indexed and the placement of the indexed words, it appears that the vast majority of subjects were satisfied with the way in which the dictionary formats were constituted.

When the data were broken down between the three groups of subjects who participated in the study, it was found that teachers of high school level visually handicapped students and librarians at residential schools for the blind responded similarly. Both were found to give more average or slightly negative responses than did the group of blind adult consumers who responded very positively. The percentage of positive responses for questions 1-11 from these three groups--teachers, librarians, and blind adult consumers--was 84%, 85%, and 98%, respectively.

Part 3 of the survey was designed to determine uses for dictionaries, to assess interest in having a recorded dictionary, to obtain additional information about the two vocal indexing methods under review, and to get information that would be useful in the design of a recorded dictionary. Trends shown in responses to the questions in Part 3 will be reported for each question.

1. What are your primary needs for, or uses for, a dictionary? The far most frequently reported uses for dictionaries were for definitions and spelling. Pronunciation and syllabication were uses also reported by a number of subjects. Subjects from all groups (teachers, librarians, and adult blind consumers) reported these needs.

2. What difficulties, if any, did you have using the same track index demonstrated on one of the experimental cassettes? Sixty-seven percent of the subjects (8 teachers, 4 librarians, and 8 adult blind consumers) reported no difficulty in using the same track index. Difficulties mentioned for this indexing method primarily related to the annoying background noises heard which sometimes interfered with intelligibility.

3. What difficulties, if any, did you have using the parallel track index demonstrated on the other experimental cassette? No difficulties in using the parallel track index were reported by 37% of the subjects (3 teachers, 3 librarians, and 5 adult blind consumers). Nearly half, 47% of the subjects (5 teachers, 4 librarians, and 5 adult blind consumers), however, reported

some problems caused by the necessity of switching tracks between the index and the content. In addition, a number of others complained there were just too many things (buttons) to manipulate.

4. Of the two index methods demonstrated on the cassettes, which did you think was best? Why? On this question 73% of the subjects (8 teachers, 7 librarians, and 7 adult blind consumers) reported thinking the same track index was best while 20% (2 teachers, 2 librarians, and 2 adult blind consumers) liked the parallel track index best. Two respondents, 7%, were uncommitted. The primary reason stated for preferring the same track was that it was the simpler to use. A secondary reason stated was that more content could be contained on a cassette. Those who preferred the parallel track favored it because there was no noise interference which made it clearer. Many of those who favored this method favored it strongly.

5. What ideas have you for improvement of either index method? Diverse ideas were offered in low frequency in response to this question despite the fact that 11 of the subjects (5 teachers, 3 librarians, and 3 blind adult consumers) said they had no ideas for improvement. Some suggestions offered were not compatible as in the cases of number of index words (1 thought there were too many, 3 thought too few) and amount of time between hearing an index word and same word in the content (1 wanted more time, 3 wanted less). Two ideas that would need to be incorporated should a recorded dictionary be produced were that the first and last words on each track be recorded at the beginning of each cassette and that each cassette be labeled with guide words. A few subjects made comments regarding the desirability of eliminating or at least reducing background noise on the same track index cassettes and a few offered comments directed at reducing distortion of index words caused by the increasing speed occurring in the fast forward mode of operation. Several comments regarding the content were that it should have been read more rapidly, that syllabication be more exact, and that when an entry is composed of more than one word it be read in such a way as to clearly indicate the different words. The two most unique suggestions were (a) that the parallel track be used for auxiliary information such as antonyms, synonyms, etc. and (b) that the index would be intelligible and applicable when heard in either fast forward or rewind. Other suggestions included improving clarity, placing beeps on the index, using C-90 cassettes, and that the dictionary, if produced, be packaged for ease in shelving.

6. Would it have been helpful if the first few letters of each index word had been given after the word was pronounced? Seventy-seven percent of the subjects (9 teachers, 7 librarians, and 7 adult blind consumers) replied in the negative to this question. Seventeen percent (1 teacher, 2 librarians, and 2 adult blind consumers) said yes. Seven percent (1 librarian and 1 adult blind consumer) said sometimes or possibly.

7. If yes to number 6, would it be worth doing so at the risk of slightly reducing the number of words that could be indexed? Of the seven subjects who responded yes, sometimes, or possibly to number 6, four responded in the negative to this question, two responded in the positive, and one said it depends on the age and ability of the user. All three of the

adult blind consumers answering yes to question 6 were in the group responding no. Eight other subjects, ones who had said no to question 6, also said no to this question.

8. The question has come up of what, other than the entry words themselves, should be spelled out in the content of a recorded dictionary. What are your feelings about spelling out irregular forms of the word, difficult or important words within the definitions, synonyms? This was a difficult question to answer because of the implicit problem of deciding what words are hard to spell. Regarding irregular forms, 17 subjects (6 teachers, 4 librarians, and 7 adult blind consumers) thought they should be spelled while 3 subjects (one of each category) did not. Regarding difficult or important words within definitions, 8 subjects (3 teachers, 2 librarians, and 3 adult blind consumers) thought these should be spelled while 11 subjects (4 teachers, 3 librarians, and 4 adult blind consumers) thought not. Those who did not felt it was distracting and that users could look up these words if desired. As for synonyms, 10 subjects (3 teachers, 3 librarians, 4 adult blind consumers) thought they should be spelled; 3 (1 teacher and 2 adult blind consumers) thought not. In summary, it appears that irregular forms and synonyms should be spelled and that some difficult or important words within definitions should be. However, the latter should be held to a minimum

9. Etymologies are not given for the words included in the experimental cassettes. Would this ommission in a recorded dictionary cause you problems? In response to this question 73% of the subjects (8 teachers, 7 librarians, and 7 adult blind consumers) said no. Of the remaining subjects, 20% (1 teacher, 2 librarians, and 3 adult blind consumers) said yes, and 7% (1 teacher and 1 librarian) said maybe.

10. Would you prefer to use a written or recorded dictionary? Why? Eighty percent of the subjects responded they would prefer to use a written dictionary, 17% that they would prefer to use a recorded dictionary, and 3% were undecided. All subjects (5) who preferred the recorded were from the group of adult blind consumers. All subjects in the teacher and librarian groups reported they preferred the written version even though 4 of the teachers were themselves blind persons. It should be noted, however, that all 10 of the librarians and at least 7 of the teachers (including 3 who were blind) were saying they personally preferred to use written dictionaries. Five of the librarians and 3 of the teachers, 40% of the combined groups, added comments indicating they thought the recorded dictionary might be useful for blind persons and/or nonreaders. The primary reasons given for liking the written version were that it was faster and easier to use, that it was familiar, and that it was easier to comprehend the written word. The reasons given for preferring the recorded version were that it would require less space to store than braille or large type editions, that probably it would be cheaper, and that it would be useful for poor readers and nonreaders.

11. Other comments: Five of the respondents (1 librarian and 4 adult blind consumers) commented on other possible applications for use of the indexing methods. These included such things as footnoting, indicating page numbers, chapters, sections of books, headings, and indexing the title of articles in recorded magazines. Also, they commented on the possibility of using the vocal indexing for production of a thesaurus, encyclopedia, and medical dictionary. Labeling of the cassettes, both on the outside and at

the beginning of the tape was mentioned by a number of subjects as being essential if the dictionary is recorded. Three subjects (1 teacher and 2 adult blind consumers) suggested that more information could be contained on a cassette if recorded at 15/16 ips rather than 1 7/8 ips used on the experimental tapes. Other comments didn't add to information already elicited from earlier questions in the survey.

Discussion and Conclusions

Note should be made of the fact that both blind and sighted persons were represented in the teacher group. Review of the data from this group showed that responses of blind and sighted teachers were quite similar.

It is apparent from the results of this study that mature persons, both blind and sighted, are able to use both the vocal indexing formats reviewed in this study with little or no difficulty. It is equally apparent that the majority of persons who participated in the review preferred the same track index to the parallel track index because it was easier to use, even though its quality was judged to be slightly poorer than that of the parallel track index.

The reason for the quality of the same track indexing format seeming poorer than the other was probably because of the background noise caused by having two messages, content and index, recorded on the same track. It is possible that the quality of the same track index could be improved by having the content recorded at 15/16 ips, which would also enable twice as much information to be recorded on the same amount of tape, although use of this rate would diminish the number of index words possible. In the current study, it was not possible to use the 15/16 ips rate because of physical limitations of the recorder used. With this particular recorder, in order to achieve the 15/16 ips rate the speed switch must be set at 15/16 ips and the variable speed must be engaged and set at its slowest rate. This creates a problem when the index is heard. With the new cassette recorder now available from American Printing House for the Blind (APH Modified Model GE 3-5192 Portable Cassette Recorder/Player), this may not be a problem. However, it will be necessary to weigh all of these factors to determine which would be the better rate to use should a recorded dictionary become a reality.

Results of the survey showed that the reviewers were fairly well pleased with the composition of the demonstration dictionary formats. Most were satisfied with the number of indexed items and their placement and did not feel that the addition of the first few letters of the index words would have been beneficial. Regarding spelling, most agreed that entry words, irregular forms of words, and some important words within definitions should be spelled out, although they felt this latter should be held to a minimum. Likewise, most agreed with the decision to omit etymologies. A number of suggestions were offered for consideration should a dictionary be recorded. These included such things as having the content read at a more rapid rate, having syllabication indicated more clearly, and having discrete words in entries comprised of more than one word clearly indicated.

Although the reviewers, as a group, were quite interested in the possibility of having a recorded dictionary, it must be noted that only 17% of them stated they would prefer to use a recorded edition to a written edition. Of those so stating, all were from the group of adult blind consumers. Therefore, it appears that the primary potential market for a recorded dictionary would be from such a population.

References

Davies, P. (Ed.) *The American heritage dictionary of the English language* (Paperback ed.). New York: Dell, 1973.

Guralnik, D. B. (Ed.) *Webster's new world dictionary of the American language* (Rev. pocket-size ed.). New York: World, 1973.

Nolan, C. Y., Foulke, E., Davis, K., & Murr, M. J. Comparison of three vocal indexes for tape recordings. In C. Y. Nolan (Ed.), *Facilitating the education of the visually handicapped through research in communications: Part two, indexes for tape recordings: Final report* (Grant No. OEG-0-73-0642). Louisville, Ky.: American Printing House for the Blind, 1976.

APPENDIXES

APPENDIX A

INSTRUCTIONS FOR USE OF TWO INDEX METHODS

Instructions for Use of Same Track Index

This section of The American Heritage Dictionary of the English Language begins with the entry word enthuse. It has been recorded at 1 7/8 inches per second on 4-track, C-60 cassettes on which two different index methods are demonstrated. These cassettes should be played on a 4-track APH-Modified GE Cassette Recorder.

In the index method demonstrated on this cassette, the index information has been recorded on the same tracks as the content, which is recorded on tracks 1 and 4. Because the index information has been recorded at a fast rate, when the content is played at 1 7/8 inches per second, the index words are reproduced at such a low frequency as to make them nearly inaudible. The index information is clearly heard when the fast forward mode is engaged. Because the index is played much faster than the content, it was not possible to index every entry; however, about half of the entries occurring in the dictionary are indexed. If the same word is entered two or more times in the dictionary, the first entry is indexed. The index words are positioned so that as soon as they are heard in the index, the same entry word will be coming up in the content. The search techniques used for locating words that are indexed and those that are not differ somewhat.

When looking for a word on track 1 of this cassette, you first set the speed control at 1 7/8 inches per second and then place the cassette into the recorder with side 1 facing up. Next, you set the track switch to the 1 - 4 position and leave it there. Then you engage the fast forward mode and listen for your word. While listening to the index, it may be necessary to vary the speed to maintain good intelligibility because the tape progressively gains speed as it moves forward. If the word for which you are looking is indexed, immediately upon hearing it, disengage the fast forward. Then push the play button. If, however, the word for which you are searching is not indexed, you will not hear it pronounced in the index. These words will be found in their regular alphabetical position in the content. To locate them you must find the first index word which alphabetically follows your word. After you have heard the index word that alphabetically follows your word, stop! for you will know your word is not indexed and that you must look for it in the content. At this point, engage the rewind mode and go back two index words. Since you will be playing the index backwards, the sounds you hear will be unintelligible garbles; however, by counting these, the desired index word can be located. If you have stopped at the first index word that was alphabetically beyond your word, then the second garble heard will be the index word preceding your word. While rewinding, place a finger on the play button. The instant the second garble is heard, push the play button and listen for your word. While listening you may want to vary the speed to speedup your search.

Entry words heard on the index are pronounced but not spelled. If you are unsure of the spelling of an entry word, engage play so you will hear it spelled in the content. After hearing the word spelled, continue searching either forward or backwards.

A sound signal introduces each new entry word in the content. After this, the word is pronounced and spelled with pauses between syllables. Following this, the part or parts of speech, the various forms, and the definitions are given. Etymologies are not. Individual entries which consist of two or more words are indicated by the reader as are entries with two or more definitions.

The operations for locating a word on side 2 are identical to the procedure described for side 1.

Instructions for Use of Parallel Track Index

This section of The American Heritage Dictionary of the English Language begins with the entry word enthuse. It has been recorded at 1 7/8 inches per second on 4-track, C-60 cassettes on which two different index methods are demonstrated. These cassettes should be played on a 4-track APH-Modified GE Cassette Recorder.

In the index method demonstrated on this cassette, the index information has been recorded on the tracks that are parallel to the tracks on which the content is recorded. The content is recorded on tracks 1 and 4 and the accompanying index words on tracks 3 and 2, respectively. The index information is heard when the track switch is set on the 3 - 2 position and the content is heard at the regular playback speed of 1 7/8 inches per second when the track switch is set on the 1 - 4 position. Because the index track is played much faster than the content track, is was not possible to index every entry; however, about half of the entries occurring in the dictionary are indexed. If the same word is entered two or more times in the dictionary, the first entry is indexed. The index words are positioned so that as soon as they are heard on the index track, the same entry word will be coming up on the content track. The search techniques used for locating words that are indexed and those that are not differ somewhat.

When looking for a word on track 1 of this cassette, you first set the speed control at 1 7/8 inches per second and then place the cassette into the recorder with side 1 facing up. Next, you set the track switch to the 3 - 2 position as the index words for track 1 will be heard on track 3. Then you engage the fast forward mode and listen for your word. While listening to the index track, it may be necessary to vary the speed to maintain good intelligibility because the tape progressively gains speed as it moves forward. If the word for which you are looking is indexed, you will hear it pronounced on track 3. Immediately upon hearing it, disengage the fast forward. Then flip the track switch to the 1 - 4 position and push the play button. If, however, the word for which you are searching is not indexed,you will not hear it pronounced on the index track. These words will be found in their regular alphabetical position on the content track. To locate them you must find the first index word on the index track which alphabetically follows your word. After you have heard the index word that alphabetically follows your word, stop! for you will know your word is not indexed and that you must look for it on the content track. At this point, engage the rewind mode and go back two index words. Since you will be playing the index track backwards, the sounds you hear will be unintelligible garbles; however, by counting these, the desired index word can be located. If you have stopped at the first index word that was alphabetically beyond your word, then the second garble heard will be the index word preceding your word. While rewinding, place a finger on the play button. The instant the second garble is heard, push the play button. Then quickly flip the track switch to the 1 - 4 position and listen for your word. While listening on the content track you may want to vary the speed to speedup your search.

Entry words heard on the index track are pronounced but not spelled. If you are unsure of the spelling of an entry word, flip the track switch to the 1 - 4 position and engage play so you will hear it spelled on the content track. After hearing the word spelled, flip the track switch back to 3 - 2 and continue searching either forward or backwards.

A sound signal introduces each new entry word on the content track. After this, the word is pronounced and spelled with pauses between syllables. Following this, the part or parts of speech, the various forms, and the definitions are given. Etymologies are not. Individual entries which consist of two or more words are indicated by the reader as are entries with two or more definitions.

When playing side 2 of the cassette, the operations for engaging the content track, which is track 4, and its index track, track 2, are identical to the procedures described for side 1.

APPENDIX B

SURVEY FORM

SURVEY FORM

Instructions

After you have had an opportunity to familiarize yourself with the two experimental cassettes on which different methods for indexing a recorded selection from a dictionary are demonstrated, please complete the attached survey form. It contains three parts. In the first, you are asked to rate your observations on specific questions regarding the experimental cassette demonstrating the same track index (index words and content on the same tracks but heard at different speeds). In the second part, you are asked to rate your observations on specific questions regarding the experimental cassette demonstrating the parallel track index (index words on a separate, but parallel, track to the content and heard at a faster rate). In the third part, you are asked for your thoughts in response to some general questions. Please type or record these making sure to number each response to correspond with the question being answered.

Return the completed survey form in the enclosed self-addressed, stamped envelope on or before 31 October 1975.

Part One

Same Track Index

Following are some questions about the same track index method demonstrated on one of the experimental cassettes you have been reviewing. Please respond to each of these questions by rating your observations concerning them on the five-point scale that follows each. Mark the one response for each question that most nearly describes your own personal opinion. Please mark your answers by drawing a line through them.

1. Were you able to understand how to use the index to help you find words in the content?

    easily
    pretty well
    with a little difficulty
    with a lot of difficulty
    no

2. Were you able to perform the operations required for searching for indexed words?

    yes
    pretty well
    fairly well
    not too well
    no

3. Were you able to perform the operations required for searching for words in the content that were not indexed?

    yes
    pretty well
    fairly well
    not too well
    no

4. After having had a little practice, could you find the words for which you were looking when they were indexed?

    always
    usually
    about half the time
    infrequently
    never

5. After having had a little practice, could you find the words for which you were looking when they were in the content, but not indexed?

   always
   usually
   about half the time
   infrequently
   never

6. About how long did it usually take you to find an indexed word?

   less than 2 minutes
   2 to 4 minutes
   4 to 6 minutes
   6 to 8 minutes
   over 8 minutes

7. About how long did it usually take you to find a word in the content that was not indexed?

   less than 2 minutes
   2 to 4 minutes
   4 to 6 minutes
   6 to 8 minutes
   over 8 minutes

8. What was the quality of the recording of the content?

   excellent
   good
   fair
   not too good
   poor

9. Did you have any difficulty understanding the content?

   none
   just a little
   some
   quite a bit
   a great deal

10. What was the quality of the recording of the index?

   excellent
   good
   fair
   not too good
   poor

11. Did you have any difficulty understanding the index?

    none
    just a little
    some
    quite a bit
    a great deal

12. Regarding the number of words indexed

    many more should have been
    a few more should have been
    just about the right number were
    not quite so many should have been
    many fewer should have been

13. Regarding the time allowed on the cassette between hearing a word in the index and hearing the same word in the content

    should have been much longer
    should have been a little longer
    was just about right
    should have been a little less
    should have been much less

Part Two

Parallel Track Index

Following are some questions about the parallel track index method demonstrated on one of the experimental cassettes you have been reviewing. Please respond to each of these questions by rating your observations concerning them on the five-point scale that follows each. Mark the one response for each question that most nearly describes your own personal opinion. Please mark your answers by drawing a line through them.

1. Were you able to understand how to use the index to help you find words in the content?

    easily
    pretty well
    with a little difficulty
    with a lot of difficulty
    no

2. Were you able to perform the operations required for searching for indexed words?

    yes
    pretty well
    fairly well
    not too well
    no

3. Were you able to perform the operations required for searching for words in the content that were not indexed?

    yes
    pretty well
    fairly well
    not too well
    no

4. After having had a little practice, could you find the words for which you were looking when they were indexed?

    always
    usually
    about half the time
    infrequently
    never

5. After having had a little practice, could you find the words for which you were looking when they were in the content, but not indexed?

   always
   usually
   about half the time
   infrequently
   never

6. About how long did it usually take you to find a indexed word?

   less than 2 minutes
   2 to 4 minutes
   4 to 6 minutes
   6 to 8 minutes
   over 8 minutes

7. About how long did it usually take you to find a word in the content that was not indexed?

   less than 2 minutes
   2 to 4 minutes
   4 to 6 minutes
   6 to 8 minutes
   over 8 minutes

8. What was the quality of the recording of the content?

   excellent
   good
   fair
   not too good
   poor

9. Did you have any difficulty understanding the content?

   none
   just a little
   some
   quite a bit
   a great deal

10. What was the quality of the recording of the index?

   excellent
   good
   fair
   not too good
   poor

11. Did you have any difficulty understanding the index?

    none
    just a little
    some
    quite a bit
    a great deal

12. Regarding the number of words indexed

    many more should have been
    a few more should have been
    just about the right number were
    not quite so many should have been
    many fewer should have been

13. Regarding the time allowed on the cassette between hearing a word in the index and hearing the same word in the content

    should have been much longer
    should have been a little longer
    was just about right
    should have been a little less
    should have been much less

Part Three

Following are some questions for which you are to type or record your responses. We are interested in learning your thoughts on these matters, so please do not feel constrained in any way as you answer them. For each, be sure to indicate the number of the question to which you are responding.

1. What are your primary needs for, or uses for, a dictionary?
2. What difficulties, if any, did you have using the same track index demonstrated on one of the experimental cassettes?
3. What difficulties, if any, did you have using the parallel track index demonstrated on the other experimental cassette?
4. Of the two index methods demonstrated on the cassettes, which did you think was best? Why?
5. What ideas have you for improvement of either index method?
6. Would it have been helpful if the first few letters of each index word had been given after the word was pronounced?
7. If yes to number 6, would it be worth doing so at the risk of slightly reducing the number of words that could be indexed?
8. The question has come up of what, other than the entry words themselves, should be spelled out in the content of a recorded dictionary. What are your feelings about spelling out irregular forms of the word, difficult or important words within the definitions, synonyms?
9. Etymologies are not given for the words included in the experimental cassettes. Would this ommission in a recorded dictionary cause you problems?
10. Would you prefer to use a written or recorded dictionary? Why?
11. Other comments:

SUMMARY AND CONCLUSIONS

The purposes of the six studies presented in Part One of this report were to determine if use of recorded reference materials is feasible and desirable for persons who are visually handicapped and to examine ways in which such materials might be presented.

Four of the studies reported (Studies I-IV) evolved from the Aural Study System, an indexing disc system, developed at the American Printing House for the Blind as a system for providing recorded text materials with supplementary written materials. In Study I this system was used in a reference application. In Study II the Aural Study System was redesigned for production and once again evaluated for a reference application. Observations made of use of the system in this study indicated the written indexes, an essential component of the system, should be redesigned for more efficient use. This was done and several formats evaluated in Study III. Production problems with the modified indexing disc system provided the incentive for redesigning the system as an indexing cassette system. In Study IV the new cassette system was evaluated. Evidence obtained from Studies I, II, and IV indicated that visually handicapped students could use reference materials in recorded form. In Table 1 the findings related to accuracy and time from these three studies are summarized and compared.

The data provide support for application of the technology developed and used in these studies to production of a recorded encyclopedia for use by visually handicapped students. Although the subjects in the three studies were not matched beyond grade level, nor the tasks necessarily equivalent, the data indicate the indexing cassette system used in Study IV provided for more efficient use, at similar levels of accuracy, than either of the disc systems previously tried.

Table 1

Comparative Data for Use of Recorded Encyclopedia Material

(Subjects from Grades 7-12 or 7-Post Graduate)

	Braille	Large type
Percentage correctly located:		
Study I[a]	88%	94%
Study II--field trial 1[b]	78%	86%
Study II--field trial 2[b]	80%	81%
Study IV[c]	87%	85%
Average per item location time for items correctly located:		
Study I[a]	104 sec.	79 sec.
Study II--field trial 1[b]	103 sec.	97 sec.
Study II--field trial 2[b]	115 sec.	92 sec.
Study IV[c]	76 sec.	72 sec.

[a] Indexing disc system using a 12-inch hard record

[b] Modified disc system using a 9-inch flexible record

[c] Indexing cassette system

The use of vocally indexed cassettes in a reference (dictionary) application was explored in Studies V and VI. In study V it was found that visually handicapped students from grades six and seven could locate dictionary entries in such materials with 88% accuracy for which the average per item time required was 136 seconds. The vocal indexing used was superimposed on the same track with the content, but heard when the fast forward was engaged. In Study VI adults were surveyed to determine their interest in having a recorded dictionary; their preference for having vocal indexing on the same track as the content, as used in Study V, or using 4-track cassettes, having vocal indexing on the parallel tracks to the content; and to obtain ideas for how such dictionary materials should be recorded. Subjects were able to use both same track and parallel track indexing to locate entry items in a recorded selection from a dictionary but greatly preferred (73% to 20%) the same track format. Interest in a recorded dictionary was not great as 80% of the subjects, all of whom might be potential customers, stated they preferred use of a written dictionary.

Materials used in the last two studies differed from those in the former in that no special equipment nor lengthy written indexes were required. Any cassette player modified for use by the visually handicapped and commonly available to them through either the American Printing House for the Blind or the Library of Congress' Division for the Blind and Physically Handicapped could be used. The advantages to the indexing cassette system, described in Study IV, were that specific places could be located more rapidly and precisely than with vocal indexing. Its disadvantages were that a special playback device was required that had to be used in conjunction with written index materials.

When student use of written and recorded media for reference materials was compared, as in Studies I and V, it was found that the written materials could be used more accurately and more rapidly. However, differences found were of little practical importance. And, when these differences are weighed against the cost savings and savings in storage space possible with the recorded media, of little, if any, importance. But, what may be of great importance was the finding in Study VI of a decided personal preference by adult consumers for use of the written media. It is not known to what extent a favorable cost for the recorded media and greater familiarity with it might do to alter this preference.

A consistent finding throughout the research done on recorded references has been that the major problem in student use of them has been in locating the correct alphabetical position of words. Many visually handicapped persons are not highly practiced in using alphabetical listings and, therefore, lack skill. With reference materials more available, it would be expected that this skill would become more polished with use.

Results of this series of studies indicate that recorded reference materials are feasible. They can be produced; they can be used. Two different ways of providing such were demonstrated.